

# The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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## Hopkins' Lead Facing for Journal Bearings.

Probably one of the most fruitful causes of heating of journals from want of lubrication is the fact that they do not fit, the pressure coming heavily upon one portion of the bearing, and leaving another part without any. Upon railway cars, owing to the methods employed in setting up trucks and fitting the parts, hot boxes are usually expected when a car first goes out of the shop until the journals and brasses have worn themselves down to a bearing. We have examined a great many brasses where the weight was really taken on a surface of only three or four square inches, instead of fifteen or more, according to the size of the brass employed. Under such conditions the wonder is, not that boxes get hot, but that they ever run cool. The improvement which Mr. Hopkins has patented is the lining of journal boxes with a thin film of lead. The metal is so soft that almost from the pressure alone the journal beds itself throughout its whole length. Though lead has never been considered a particularly valuable metal for a bearing, yet it is found that under these circumstances it displays a remarkable degree of durability. We have seen brasses which had run upward of 30,000 miles without wearing through a film of soft lead, which was at first only 1/16th of an inch in thickness. In this case the journal was polished to a brilliancy equal to that of a mirror, every opening or grain in the iron having been completely filled up. When the wear is continued till the lead is worn through the brass itself takes a polish of most extraordinary fineness, resulting from the filling of the pores of the metal, apparently by the worn particles, which seem to be cemented in their places by means of the lead.

Messrs. Geo. R. Meneely & Co., of West Troy, New York, the well known bell founders, have for some time past been making a bronze journal bearing which shows a very great endurance, and while it wears the journal very little produces very little friction. These journal brasses after being turned and fitted are placed upon a mandrel and a lead lining cast in them, as shown in Figure 1. This insures a fit between the journal and brass just as soon as they come together. For example, take such a journal as that shown in Fig. 2, which is worn small in the center, if a new and hard brass were put upon it the bearing would be at or near the collars only, and heating would be inevitable until the bearing and journal had worn to fit. With the lead lining the bearing and journal fit at once, and there is no danger from heating. We have known of bearings which had been cutting to such an extent that great grooves had worn in them, made to run cool by filling up the grooves with strips of lead till a surface was obtained, and then putting on the brass.

The following is an official report of the comparative wear of journal bearings upon the Boston and Albany Railroad, as ascertained from tests made during the last year. It was presented at the Annual Convention of Master Car Builders, held in New York, June 15 and 16, 1876, and forms part of the minutes of its proceedings:

Babbitt.	Lead Lined.
Number of bearings taken out.	16
Total weight of bearings put in.	153 lbs., 15 1/2 oz.
Total weight of bearings run.	161 lbs., 3 1/2 oz.
Total weight of bearings put in.	422,634
Total weight of bearings when taken out.	922,638
Average No. of miles run per oz. worn out.	\$36.95 (24c. per lb.)
Total weight of bearings when taken out.	\$48.35 (30c. per lb.)
Total weight lost.	102 lbs., 10 1/2 oz.
Total weight lost.	104 lbs., 13 1/2 oz.
Total weight lost.	51 lbs., 5 oz.
Total weight lost.	56 lbs., 5 oz.
Cost per 1,000 miles.	5.58 cts.
Cost per 1,000 miles.	2.97 cts.
Per cent. saved by using lead lined.	47.

The advantages of the lead lining and bronze bearings are by no means confined to use upon railway rolling stock, although most of the experiments made to test their value have been made upon cars. They are of even more value upon lines of shafting, on steamers, and in similar situations, where heating and trouble with bearings are likely to occur.

The Tucuman Railway in the Argentine Republic has been recently completed. It is the longest railway in South America, and was finished in four years. The contract was signed September 28th, 1872, and the line was completed September 28th, 1876; Mr. Telfener, the contractor, has accordingly become entitled to a premium of £20,000. The line has cost only £4700 per mile, and is the cheapest yet constructed in the Argentine Republic; its length being 366 miles, the total expenditure which it has involved has been £1,000,000.

## Hardick's Improved Direct-Acting Steam Pump.

The pump we illustrate was designed to meet various requirements of service not usually regarded by manufacturers. Among the advantages claimed for it by the manufacturer are, that it is, so far as consistent with durability, cast in separate parts, so that in case of accident or breakage, the immediate part affected need only be replaced, as its cylinders are separate from bed-plate, water valve chest, discharge and air chamber; each being separate, is an important item of economy in severe climates, where, by the action of frost, all metal vessels are liable to fracture. The valve

at Paris in 1878 would be likely to prove a serious blow to British industries.

### Mr. Bell's New Iron Rail.

We present below, from English journals of late date, two statements of interest concerning the probable result of the experiments now being conducted in the North of England, looking to the production of an iron rail that will equal a Bessemer steel rail in durability and other desirable qualities:

The Stockton *Mercury* is rather jubilant at what it terms an "important discovery in iron manufacture." "We learn," says our contemporary, "on the best authority, that the

invention, that it will fulfill all the hopes which are formed of it—a fact of the very greatest importance to the railway interest and the iron trade generally, more especially the rail trade of Cleveland."

The *Railway News* has the following: "A paragraph has been going the round of the papers containing statements which, if borne out by the actual results, would be of considerable importance to railway companies. The paragraph referred to states that Mr. I. Lowthian Bell has, at the instance of the North-eastern Railway, completed a number of experiments, and has satisfied himself that Cleveland iron can by his process be treated so as to make it equal in point of durability to steel

iron, for the softest homogeneous iron will wear out half a dozen of the best non-homogeneous or puddled iron rails. Iron may be alloyed or otherwise hardened or improved, but so long as iron is puddled and piled it will have a lamellar structure, and the action of heavy wheels upon it will elongate and detach the upper strata from the lower, and cause a rapid destruction of the rail. One may see the same action going on in deal planks used for wheeling barrows upon, the longitudinal grain of the wood causing the splitting off of the surface immediately acted upon by the wheel, and hence on all wood pavements the blocks are placed with the end of the grain upward.

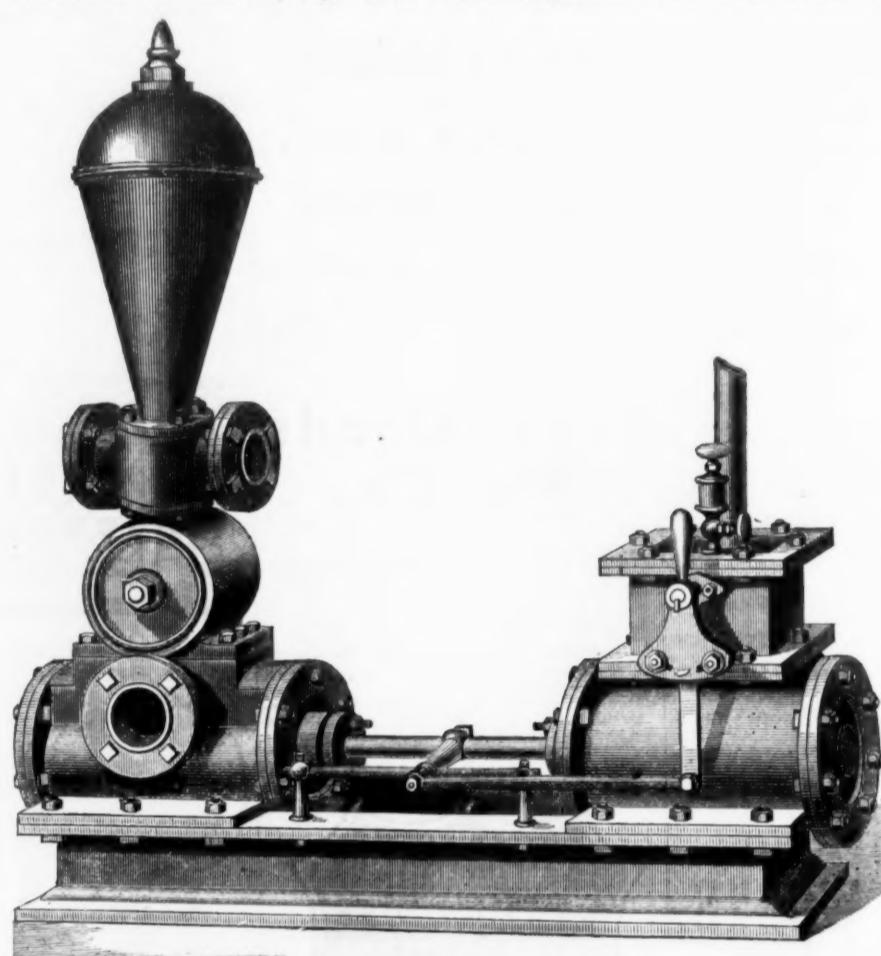
"There is one statement in the paragraph to which we have referred which somewhat surprises us. It is to the effect that old steel rails are of little value. The fact is that steel rails remain at all times as perfect pieces of metal as when first laid down. A steel rail may be worn and reduced in section by long continued abrasion of particles from its surface; but it is not split and disintegrated like an old iron rail. We cannot understand why it should be stated that old steel rails are of little value. The great competition which exists in their manufacture enables them to be produced at a much lower price than other forms or sections of steel bar. The material of which the rail is composed is precisely as good after it has undergone any amount of wear, and the old rails can be used for many purposes for which it would not be economical to buy new steel. Old steel rails may be put through splitting mills, *hence* a very small amount of rolling in proper grooved rolls, and almost entirely without loss of weight, can be converted into round, square or flat rods, wire, etc., useful for innumerable purposes, at much less cost than such rods could be made for from ingots of new steel. We are informed that a large number of steel plates are made in Sheffield from rail ends by cross rolling the waste pieces, for which excellent prices are obtained.

"As to the economy with which the new process can be carried out, it is difficult to see how it can possess any advantage in this respect over that of producing steel rails. There are now several works in this country making steel rails on the original plan patented by Mr. Bessemer, and working from the blast furnace direct, thus avoiding the labor and cost of making pigs and then remelting them. By the means in use at these works the fluid crude iron when converted is formed into ingots of the proper weight for two rails without any manual labor, and wholly without fuel, in about 25 minutes. It would be curious to see any process by which Cleveland ore could be dealt with more economically than by the plan adopted in this method of treating iron as it passes from the blast furnace. We are informed that Messrs. Bolckow, Vaughan & Co. are erecting works in the Cleveland district for the manufacture of steel rails. We would imagine that the firm would scarcely have gone to the expense of erecting works of this description had they been aware that some material equal in quality and lower in price could be produced by other processes direct from Cleveland ore."

Paper and paper-hangings are going abroad in a lively manner. The two agents sent abroad last summer to canvass for their sale have met with a degree of success which must prove an incentive to efforts in the same direction by other trades. Nearly a hundred tons of papers, varying in quality from cheap straw to fine ledger, have been sent to England in spite of the derision of British newspapers and the opposition of the dealers. The ability of the United States to export this line of goods in competition with its principal rival is established. The agent in England has just returned to this country, but he has left matters in a satisfactory shape, and the export will continue.

He says it is possible to send paper-hangings to England also, but canvassing must begin earlier; the trade for 1877 in that quarter is over. The South American agent is having good luck in the sale of hangings. His orders from points on the west coast are large. He writes that more direct communication with New York is essential to a large sale of papers, because the freights from England are at present much cheaper; but hangings can be sold in spite of drawbacks. Meanwhile the regular export of these two kinds of goods is steadily increasing.

The fastest time across the Pacific has been made by the Occidental and Oriental steamship Oceanic. The ship arrived unexpectedly at San Francisco on the 26th ult., fourteen days and fourteen hours from Yokohama, beating by twenty-one hours the time of the City of Pecking of the Pacific Mail Line, on a recent trip, which up to that time had been the best across the Pacific. The rivalry between these two lines is now being pushed to the extreme, and their steamers are forced to carry freights at ruinous prices. Flour is carried at from \$3.50 to \$4 per ton, a rate very much less than from this port to Europe, while the distance and cost of carrying is very much greater. It is becoming a life and death fight between the lines.



HARDICK'S IMPROVED DIRECT-ACTING STEAM PUMP.

chest is very conveniently arranged for giving access to the valve in case of an obstruction of any kind. Access to the valves is obtained by the loosening of a single nut. The valves are plain, square pieces of metal, and in case of accident can be replaced by blocks of wood. This is a feature of much value, as it frequently happens when a pump is at work at some distance from a town that a metal valve would be a difficult thing to obtain. Where it is desired, leather, rubber or vulcanized fiber can be used to face the valves with. The pistons are fitted

hopes sometime since expressed by the chairman of the Northeastern Railway Company (Mr. Leeman, M. P.) that the experiments being carried out at the instance of that company, by Mr. Isaac Lowthian Bell, M. P., one of the directors, and the leading scientific authority in the northern iron trade, promise the greatest success. An eminent railway official has asserted confidently that by this process iron rails can be produced which will be more durable than steel, and which will have the merit of being much cheaper. This will be good news

rails. The value of such a discovery to the Cleveland district would be enormous, and railway companies might fairly look forward to a considerable saving in the future in the important items of permanent way charges if experience should show these results can be obtained. Inquiries which we have made lead us to the opinion that, whatever may be the practical value of the process referred to in improving the quality of inferior Cleveland ores, it will scarcely produce a material equal to that known as Bessemer steel. If Mr. I. Lowthian

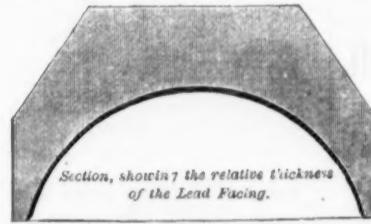


Fig. 1.

HOPKINS' LEAD FACING FOR JOURNAL BEARINGS.

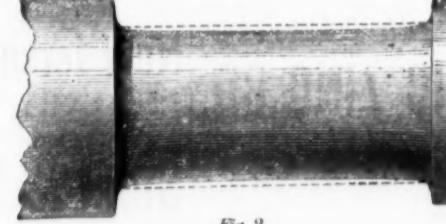


Fig. 2.

with metallic packing, those of the water end and the lining of the cylinder usually being of composition where salt water, beer, liquors, molasses, syrups or acids are to be pumped. The piston and follower are so arranged, however, that hemp packing can be used if desired. The arrangement of the valve gear is such that the pump has no "centers," and will start in any position where there is a sufficient head of steam to overcome the resistance of the pump. This feature enables the pump to be started with certainty, even when, as is often the case in mines, it is "drowned out," or considerable distance under water. The manufacturer of this pump is Chas. B. Hardick, of 23 Adams street, Brooklyn, N. Y.

English manufacturers look with little cordiality on the French Exhibition of 1878. The London papers say "the world is tired of exhibitions." The fact is they dread another competition with American manufacturers in the presence of the world. Their defeat at Philadelphia is well understood in Europe, and is hurting their foreign trade, and another such

for Cleveland in the present depressed condition of her manufactured iron, and especially of her rail trade, which forms so large a feature in her industry. It has been the fashion to assert that the prosperity of Cleveland had departed, because of steel rails taking the place of iron. Cleveland iron, so far as is yet known, is not being available for the manufacture of steel. The present experiments having proved so successful under the direction of the late president of the Iron and Steel Institute, at the works at Port Clarence, Middlesborough, put a new face on things. We learn that it is estimated that iron rails, greatly superior to steel in point of durability, can be produced at a cost of £1 per ton over the present ordinary iron rail, which will, therefore, largely undersell steel. There is the further advantage that the new class of rails will be convertible, and, therefore, be worth when worn out two-thirds of their original value; while steel rails when worn out are comparatively worthless for any purpose, so far as yet can be ascertained. There seems the greatest confidence, on the part of those who know the facts relating to the new

Bell has succeeded in discovering a way of so far improving the quality of the Cleveland iron as to make it equal to the iron of the Staffordshire district he will have accomplished an important result. We shall require, however, very considerable evidence of the practical results of this discovery before we bring ourselves to believe that iron rails can ever be made in point of durability equal to steel rails. Many attempts have been made to employ the Cleveland iron in the manufacture of steel, but hitherto without success in a financial point of view. The nearest approach that has been made toward giving iron rails a greater durability was under what is known as Dodd's patent, by which they were case hardened, and the surface converted into steel. The plan of puddling steel for rails has also been tried, but in no case has the rail produced been equal to those made from cast steel. Puddled iron has inherent defects which up to the present time have not been successfully removed. Every one who has paid any attention to the subject must be aware that it is not merely the quality of hardness which gives steel its superiority over





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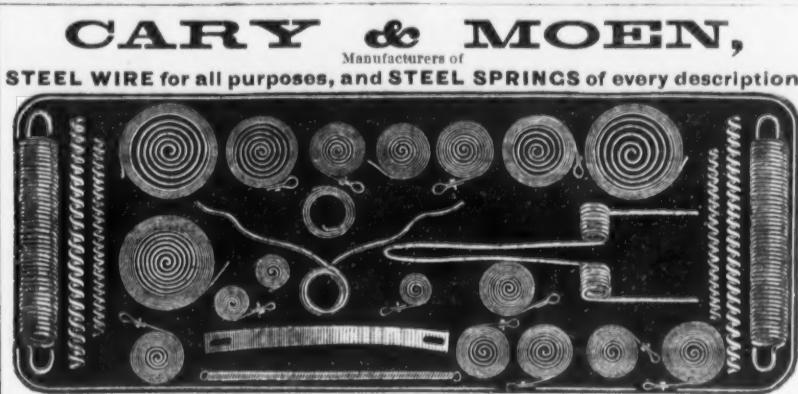
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**CHISHOLM'S PATENT ASH-SIFTER**

In offering this machine to the public, we would state that no fear need be entertained as to its durability, as it having been taken in the manufacture. The wood used is of the best quality of matched pine, and made in such manner as to prevent any dust from escaping when the Sieve is being worked. The cog-wheel Ash-Sifter should be used by all having the care of Boilers, Furnaces, &c., and are likely to supplant all others. We claim it will do the work of any five machines now in use. It is always ready; can be washed, cleaned, and for any use. The siftings are placed in the Hopper on top of the Sieve, which we will designate as A. The weight of the ashes opens a trap door under the Hopper and enters the Sieve, which is suspended on an angle by double-jointed D. hooks. X K is a large cog-wheel fastened on the side of Sifter, and connects with one one-fourth its size, which is secured on a crank shaft, and connects an arm with the Sieve. B, Ash-box door; C, Ash-box; D, part of the screw which connects the Sieve; E, the coal-bin door; F, coal-bin. L is the opening where the coal slides into the bin, while being sifted; G, door on top to take out clinkers, &c. With one revolution of the cog-wheel K, we get from ten to fourteen motions of the Sieve. We make three sizes: No. 1, three and a half feet long, two feet six inches high, and twenty inches wide, price, \$25; No. 2, four feet long, thirty-three inches high, and two feet wide, price, \$30; No. 3, five feet long, forty-four inches high, and two feet wide, hopper to hold one-half barrel, sifting it in less than one minute, price, \$35.

References can be had upon application to parties now using the sifter. All Sieves warranted to give satisfaction.

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**Straightening and Planishing Metal Bars.**

Mr. Edmund Butler, of Kirkstall Forge, Leeds, in a note on this subject, says:

It having been suggested to me to describe the process of straightening and planishing of round bars direct from the rolls as practiced at Kirkstall Forge, and which process, it may be considered, is a progressive step in the manipulation of round bars, the following few observations have been thrown together, and it is hoped that the brief explanation now given may be of service to those who may care to see the machine in operation, by calling attention to the particular imperfections in the rolling of round bars which it is intended to remedy, and by pointing out the advantages which are gained by it. It is not necessary to say anything about the importance to the millwright, engineer or machine maker, of having his round iron really round, and, what is of equal or even greater importance, straight. Nor is it necessary to speak of the difficulty the iron maker experiences in endeavoring to supply to the user such an article.

In spite of all the care and skill that can be exercised in the rolling mill, the ordinary round bar leaves it as a somewhat imperfect and but approximate cylinder, neither truly round nor truly straight.

It is a comparatively easy matter to straighten a bar which is bent in one uniform curve from end to end, but it is the short bends, crooks, or "dog legs," which are the main difficulty, the presence or absence of which makes a bad or good round bar; and these, which appear to be more or less inevitable in all rolling, can only be effectively removed while the bars are still hot, for with cold straightening there is always a tendency in the bars to revert to their original form when the skin is removed in the lathe. The production of a machine to accomplish the desiderata now in question has long occupied the attention and taxed the ingenuity of the iron master, particularly for the larger sizes, and many schemes have been initiated and tried, but the machine now under notice is the only one known to the writer which effectively removes "dog legs," and produces round bars sufficiently straight to be used for most ordinary purposes without being turned in the lathe.

The original idea, of which this machine is the embodiment, is due to Mr. J. Robertson, of Glasgow, though the same idea seems to have occurred almost simultaneously to Mr. G. W. Dyson, of Sheffield, and it is the general arrangement of the latter which has been adopted, though, since it passed out of the hands of these gentlemen, many improvements and additions—the results of practice and experience—have been made, which have given it the success it has now attained.

The bars are passed while still hot from the rolls between two revolving discs having beveled faces, which, when brought together so as to compress the bars between them with the degree of force thought necessary, rotate them, and, at the same time, traverse them forward, also by a mechanical arrangement backward, so that the whole length of the bar is acted on by one continuous movement, and the bars come out straightened and planished. In doing this, moreover, two other important results are produced, the most palpable of which is that the scale, instead of being rolled in, as might be supposed, is entirely removed, and the surface is made smooth.

The skin is brought to a very high degree of cleanliness and smoothness, so much so that a mere rubbing with emery cloth, or if the bar be put into the lathe with emery stick, polished it as though it had been turned and polished in the ordinary manner. In some small samples on exhibit, one end is left blue, as from the machine, and the other end is polished as just described, in order to show the inappreciable difference in diameter between the two portions. This is already done practically, and shafting is now running, which has been put up without being turned, while other shafting, after being put up in the same manner, has been polished in its place; and, again, the bars have been put into the latter and finished with the file and emery stick without being turned. To carry the finishing process still further, if the bars, after being allowed to go cold, are passed again through the machine several times, the blue skin disappears, and the bars come out actually bright.

The other effect of the machine before referred to, and that a very important one, is that, by the action of the discs, the bars are slightly compressed, and consequently strengthened.

Mr. David Kirkaldy has made some experiments to test the torsional strength; and in order to make proper comparisons, bars, after being rolled in the ordinary way, were cut in half, one portion being left with the ordinary finish, and the other portion being put through the machine; and it was found that up to the point of elastic stress the machined bars had gained 20 per cent. in torsional strength. Mr. Kirkaldy's original report is open to the inspection of any gentleman who may care to examine it; and several of the pieces tested are preserved. Some further experiments are about to be made on bars which have been operated upon recently, the machine having been much improved since the bars first tested were made, and now even better results are looked for.

Again, it is well known that a turned bar is not so strong as one of the same diameter which has been rolled in the ordinary way and left rough, that is to say, if a bar of, say,  $3\frac{1}{4}$  inches diameter, is turned down to 3 inches, it is not so strong as a bar rolled to that size and left rough; the additional strength arising from the non-removal of the skin of the rough bar. As, then, bars straightened and planished by this machine are 20 per cent. stronger than the same bars left with ordinary finish, if the comparison be made with turned bars, it is still more

favorable to the machined bar, and it is, therefore, important to use them wherever possible without turning, the polishing with emery removing so little of the skin as not appreciably to interfere with the strength.

With a view to render as economical as possible the operation of polishing these bars bright with emery, and without the expense of centering and putting in the lathe in order to use the emery stick, a machine has been constructed by Mr. Robertson to rotate and traverse the bars across the face of an emery wheel; and this first machine, on which great improvements are now being made, is now at work at Kirkstall Forge.

**Some Recent Inventions.**

The Centennial Exhibition afforded the opportunity to bring into public view many inventions and improvements which otherwise would only have been known to the smaller circles that may find them of service. Further publicity will soon be given by the judges' reports specifying the reasons for granting awards. These reports are looked for with great interest by all the favored exhibitors, but are as yet delayed, except in a few instances. It is quite certain that they will be voluminous. People who have wares to sell which the reports speak well of are likely to show good business enterprise by taking other means than the official publication will furnish to make such merits known. But this will not be the case with minor novelties, and in general with things that do not promise present profit by sales.

There is, for instance, an ingenious device for communicating directly to a central office by telegraph the changes in the weather, which are shown by recording instruments at different stations.

It promises to dispense more or less with the work of the weather observer at each station, and to substitute the automatic work of machinery. This is a foreign exhibit. As shown, it is perhaps better adapted for its present use in one of the smaller European states than in this country. But if modified by Yankee ingenuity so that a separate telegraphic circuit would not be required for each station, it might prove of service here. The telephone is a new instrument of electrical science more likely than some of the rest to find immediate use. It operates by transmitting the current through a tuning-fork. The fork will only vibrate a given number of times in a second. A message can be sent through it by the usual Morse code, there being no apparent interference between the tuning-fork vibrations and the message. But at the other end of the line the message can only be taken off through a tuning-fork in unison with the first. Consequently if a tuning-fork of different pitch is interposed at each of several stations served by one wire, and the messages are sent through forks of corresponding pitch from the head office, the message to one station will not be repeated at the others during transmission.

Sir William Thomson, at the Glasgow meeting of the British Association for the Advancement of Science, gave foreign notoriety to another of the Centennial exhibits that has attracted great attention from the judges of the group to which it belongs. It is a curious device that might fairly find place in the magic of Arabian tales. A membrane is stretched over the end of a short speaking trumpet. The membrane carries a small piece of metal which is, so to speak, the armature of a magnet. The magnet forms part of a telegraph circuit, through which a current is passing. To send a message it is only needful to talk loudly into the trumpet. The message is received by a similar trumpet with membrane and armature at the other end of the line; and that trumpet being placed to the ear repeats the sound like an echo. Don Pedro was with the scientific people who tested this instrument on one occasion. So accurately did it reproduce sounds that each member of the party was in turn recognized by peculiarities in voice or accent. The final test was the reading of a paragraph from the news columns of the Tribune. Of what use is such an invention? Well, there may be occasions of state when it is necessary for officials who are far apart to talk with each other without the interference of an operator. Or some lover may wish to pop the question directly into the ear of a lady friend for himself her reply, though miles away; it is not for us to guess how courtships will be carried on in the 20th century. It is said that the human voice has been conveyed by this contrivance over a circuit of 60 miles. Music can be readily transmitted. Think of serenading by telegraph!

The calculating machine at the Fair was another of the new and strange inventions. Primarily it is an "adder." But it adds differences in groups and under all sorts of circumstances. Arrange it in one way and it will turn out cube numbers for you as fast as you can turn a crank. In another arrangement it will turn out logarithms as readily. Put on steam-power and it will do the work that it is set to without further attention. It furnishes its results stamped in a matrix ready for the stereopticon; no proof-reading is required. To the non-mathematical visitor its performances are utter mystery. Yet few machines are simpler. Take cubes for instance, 1, 8, 27, 64, &c.; subtract them from each other and the result is 7, 19, 37, 61, &c.; subtract these from each other and the result is a set of numbers that only differ from each other by 6. All that the machine does is to add these differences, beginning with those of 6 each. Yet in the endeavor to make a machine that would actually do this work many distinguished mathematicians have failed—among them the illustrious Englishman, Babbage. His machine is now lying idle and useless at the Kensington Museum. The American "difference engine" is pronounced by our experts perfectly successful. But what is to be the effect on our posterity of inventions like this? Already a modified contrivance of the sort makes short work of the multiplication table. Our grandchildren—nay, our children—will be turning a crank or twisting a screw instead of working out the four rules with slate and penknife. Of the three R's, that which was the most essentially intellectual threatens to become the most mechanical.—Tribune.

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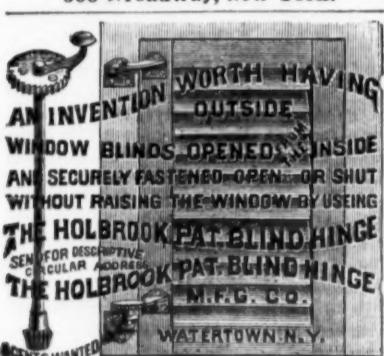
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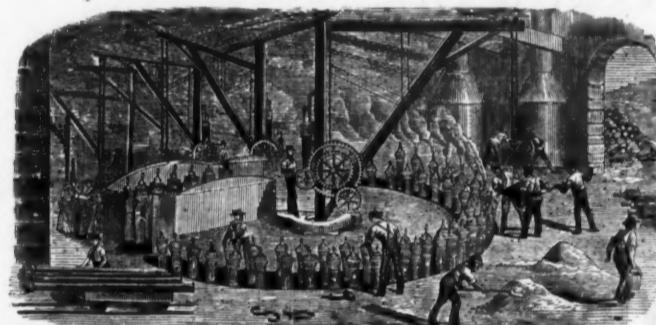
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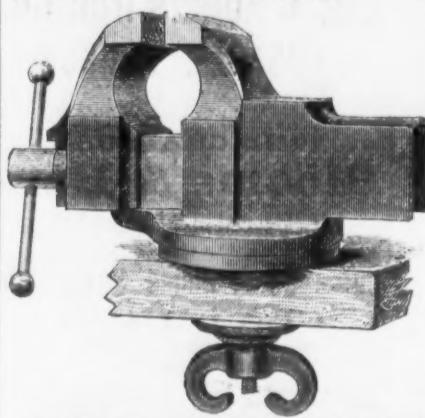


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## Protest of Steel Makers.

To the Secretary of The American Iron and Steel Association—Sir: Having learned, to our great surprise, that certain grades of steel of low carbonization have been entered and allowed to pass through the custom house at the port of Boston, classed and appraised as iron, we earnestly request you to visit the Secretary of the Treasury, at your earliest opportunity, and call his attention to the following statement:

First.—Wrought iron is a technical term, known to the trade as covering all that class of iron which has been welded together from small, pasty particles while in the solid state, and which will not sensibly harden by dipping, when at a red heat, in water.

Second.—In fabricating masses of iron from small particles, in a solid state, it has been determined by practice that it is absolutely impossible to produce a homogeneous mass by this method.

Third.—There are methods by which steel can be manufactured: a.—By converting wrought iron while in a solid state, which is known as the "cementation process." This method is not capable of producing a homogeneous metal, because the wrought iron from which it is made is not homogeneous, and the iron remains in its solid condition during the cementation. b.—The fusion in crucibles of wrought iron or of carbonized iron into a liquid condition, and then purifying it at a high temperature by the use of various ingredients. This is known as the "crucible steel process," the carburization or decarburizing being effected while the metal is in a fluid condition. The product when properly made is strictly homogeneous. c.—Arresting the decarburization of pig iron at the desired point. There are two divisions of this method: first, as practiced in the puddling furnace in the manufacture of puddled steel, in which case the decarburization is arrested while the mass is in the solid state, and, in consequence, the product will not be homogeneous; the second division embraces all those methods in which the decarburization of pig iron is arrested at any point below 1/4 per cent. of carbon, while the metal is in a fluid condition, such as the "Bessemer" and the "Martin-Siemens" processes, both of which are capable of producing a homogeneous metal. d.—By decarburizing and re-carburizing pig iron while the metal is in a fluid condition, as practiced in the "Bessemer" and "Martin-Siemens" open-hearth processes, the product of which is homogeneous.

Fourth.—From the foregoing statement it will be observed that in all the wrought iron of commerce hitherto made, whether by the initial Catalan process or by the more generally practiced puddling process, a distinguishing characteristic of its manufacture has been that it is decarburized while in the solid state, and it will also be noticed that all such iron so made possesses a distinguishing physical feature, that of not being homogeneous.

Fifth.—All metal produced by the "Bessemer" or "Martin-Siemens open-hearth" process, of whatever degree of carbon, bears the evidence of having been made while in a liquid condition, and has the distinguishing physical character of homogeneity. The appearance of fractured wrought iron is entirely different from that of steel, the former possessing a fibrous character. If the iron exhibits a granular fracture, as it occasionally does, even then it is radically different from the peculiar granular structure of cast steel, and easily distinguishable by a practiced eye.

Sixth.—In the manufacture of iron and steel the waste of metal increases with an increase of temperature. Therefore, metal produced by any liquid process will cost more to manufacture, as at present practiced, than wrought iron produced at so low a temperature as not to reduce it to a fluid condition.

Seventh.—It is a fact well known to metallurgical experts that in the manufacture of metal by any liquid process, as described, the more perfect the decarburization is, the greater will be the cost; hence, steel low in carbon produced by the "Bessemer" or the "Martin-Siemens open-hearth" process costs more to manufacture and commands a higher price in the market than steel of such manufacture containing larger percentages of carbon.

Eighth.—Iron cannot be produced by either the "Bessemer" or "pneumatic" or the "Martin-Siemens" or "open-hearth" processes, for the reason that, after the decarburization of the contents of the Bessemer converter or of the open-hearth furnace, the metal contains so great a quantity of oxide that should it be taken therefrom before being re-carburized—with the view of using it as iron—the product in that condition would be such as could not be worked and would be unmerchantable. Therefore, the contents of the Bessemer converter and the open-hearth furnace must be re-carburized, thus converting it into steel, before it can be made useful or merchantable, and the resulting metal is steel and nothing but steel.

Ninth.—For the reasons herein given, we consider the use of the term wrought iron to denote homogeneous metal produced by any liquid process as unwarranted, and an abuse of technical nomenclature, calculated to result in great loss of revenue to the government and of immeasurable distress to the trade. We therefore express the hope that the honorable Secretary of the Treasury will, if not inconsistent with his sense of public duty, instruct the collectors of customs in all the ports of entry in the United States, that all metal produced by the Bessemer, Martin-Siemens open-hearth, or any other processes by which decarburization is conducted while the metal is in a liquid condition, must be classed—and pay the duty provided by statute—as steel.

In addition to the foregoing, we hope the

proper classification and improper levy of

30 per cent. duty on steel wire rods less than one-quarter inch in diameter may be corrected. It is clearly provided in the statute that steel in coils shall pay the same duty as steel in ingots, sheets or bars, and not be classed as "steel not otherwise provided for."

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Burgess Steel and Iron Works, Portsmouth, Ohio.

The Production of Pig Iron in 1876.

Commenting on the tables of iron production in 1876, published in our last issue, Mr. James M. Swank says in the *Bulletin of the Iron and Steel Association*:

These figures show a total production in 1876 of 2,050,000 net tons of pig iron, against 2,266,581 net tons in 1875—a decrease of 216,581 tons, or about 10 per cent. The shrinkage in production in 1876 will, however, be more apparent if we compare the make of that year with that of the four years immediately preceding. In 1872 the production was 2,854,558 net tons; in 1873 it was 3,065,328 tons; in 1874 it was 2,689,413 tons; in 1875 it was 2,266,581 tons; and in 1876 our estimate gives 2,050,000 tons. The decrease since 1873, our year of greatest production, is thus seen to be, in round numbers, 800,000 tons, or fully 25 per cent. This is a very great reduction, but any estimate of its significance which the reader may make will be erroneous if it does not allow for the increased tendency in late years to substitute old rails for pig iron. Nevertheless, the shrinkage in the quantity of pig iron produced in this country since 1873, after making due allowance for the use of old rails, is not a cheering subject to reflect upon, especially when we remember that the furnace capacity of the country is equal to the production of twice the quantity of pig iron produced last year.

Of the total estimated production of 1876, 287,000 net tons were charcoal, 777,000 tons were anthracite and 986,000 tons were bituminous. The production of bituminous iron in 1876 was a trifle larger than in 1875; that of anthracite and charcoal each decreased fully 100,000 tons—the shrinkage in charcoal being relatively much greater than that of anthracite, amounting to more than 25 per cent. In 1875 the production of bituminous pig iron for the first time overtook that of anthracite, exceeding it about 40,000 tons; but in 1876 it shot ahead about 200,000 tons.

Our table shows that stocks of pig iron have decreased from 760,908 tons at the close of 1875 to 660,000 tons at the close of 1876—a shrinkage of 100,000 tons, or about 13 per cent. The figures we present for both years represent stocks unsold in the hands of furnace men or their agents, our object being to show the relation of the producers to the market. We do not include stocks in the hands of consumers, speculators, creditors or importers. It is not possible to obtain figures representing stocks after they leave the hands of the makers, but it is possible to obtain the statistics of pig iron in first hands, and these only we give. It is proper to remark, however, that where stocks of pig iron are held by furnaces which are connected with rolling mills they are necessarily included in our table; also that hypothesized stocks are likewise included.

Of the total stocks of pig iron held by furnaces and their agents at the close of 1876, our information shows that 225,500 tons were charcoal, 276,500 tons were anthracite, and 158,000 tons were bituminous. At the close of 1875 the exact figures were as follows: charcoal, 320,682; anthracite, 274,743; bituminous, 165,482. It will be seen that practically no

change has taken place in the stocks of anthracite and bituminous, except in their distribution, which a study of the table will fully indicate, while the decrease of 100,000 tons has been wholly in charcoal. It is here proper to remark that several thousand tons of Lake Superior charcoal held at Cleveland are included in our table among Michigan stocks.

All testimony agrees that stocks of pig iron in the hands of consumers are very low, perhaps lower than ever before known. Some of the rolling mills are carrying a larger supply of muck bar than usual, but not many. The mills generally have less pig iron on hand than usual, and this is true also of the foundries. A decided improvement in the demand for iron would find the mills very generally unprepared to meet it, except so far as that unknown quantity, old rails, might help them; while the foundries would certainly have to buy largely of pig iron.

We do not learn that much pig iron is anywhere held by the creditors of unfortunate furnace men, so that producers have but little to apprehend from that quarter. Probably 50,000 tons of American pig iron have passed from first hands into the hands of speculators, as we learn that 10,000 tons are so held at New York and 23,000 tons at Pittsburgh.

Of foreign pig iron in the hands of importers there cannot be much, as the total importations of 1876 did not probably exceed 50,000 net tons, all or nearly all of which was Scotch iron for immediate consumption.

From the best information we have been able to obtain we do not consider it probable that the stocks of pig iron in the hands of consumers, creditors, speculators and importers at the close of 1876 exceeded the quantity estimated to have been so held at the close of 1875, namely, 200,000 net tons.

The consumption of pig iron in 1876 we have already stated were about 50,000 net tons. In 1875 they aggregated 66,000 tons. Our exports of pig iron in 1876 amounted to about 4000 net tons, against 8700 tons in 1875.

The consumption of pig iron in the United States in 1876 was undoubtedly much less than in any of the years immediately preceding. We have estimated that we produced 2,050,000 net tons; reduced the stocks of the preceding year 100,000 tons

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Price lists and information furnished on application.

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RASPS,

Best Cast Steel.  
HAND-CUT. Manufactured by  
JOHNSON & BRO.  
No. 1 Commercial Street, Newark, N. J.

Established 1835. TRADE MARK ON

JOHN ROTHERY  
TRADE MARK  
MATTEAWAN  
N. Y. John Rothery's

HAND-CUT FILES AND RASPS,  
Made from English Cast Steel.  
JOHN & WILLIAM ROTHERY,  
Matteawan, N. Y.



Putnam's Government Standard  
FORGED

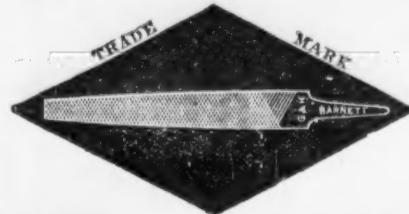
Hammer Pointed  
HORSE SHOE NAILS,  
READY FOR DRIVING.

Manufactured from the best of NORWAY Iron,  
and warranted to give entire satisfaction.

S. S. PUTNAM & CO.,  
NEPONSET, MASS.

## Black Diamond File Works.

Send for Illus-  
trated Price List.



Send for Illus-  
trated Price List.

G. & H. BARNETT, 39, 41 & 43 Richmond St. Phila.  
LINFORTH, KELLOGG & CO.

Sole Agents for the Pacific Coast, 3 & 5 Front St., San Francisco, Cal.  
St. Louis, Mo., SEMPLE & BIRGE MFG. CO., Agents.  
THOS. TAYLOR, 43 Chambers St., N. Y., Agent for N. Y. and N. E. States.

Established 1816.

Peter A. Frasse & Co.,

95 Fulton Street, New York,

SOLE AGENTS FOR

Thomas Turner & Co.'s Suffolk Works  
SHEFFIELD.

FILES AND HORSE RASPS,

And Importers of

P. S. STUBS' FILES, TOOLS & STEEL,

W. J. Davies' Sons' London Emery Cloth,  
HUBERT'S FRENCH EMERY PAPER.

THOS. JOWITT & SONS, SHEFFIELD,

Manufacturers of every description of

FILES.

Forged, Ground and Cut by  
Hand and Tempered by an  
Improved Process.

Manufacturers of

CAST, SHEAR & BLISTER  
STEEL

\*For various purposes.

Granted according to Act of Parliament, and Registered in Germany and the United States.

AGENTS:  
Messrs. Russell & Erwin Mfg. Co.,  
New York and Philadelphia.  
Messrs. Quackenbush, Townsend & Co.,  
New York.

Messrs. Huntington, Hopkins & Co.,  
San Francisco and Sacramento.  
Messrs. Frothingham & Workman,  
Montreal.

CHARLES B. PAUL,  
FILES.

Manufacturer of  
HAND-CUT

187 Tenth Street, Williamsburg, New York.

Warranted  
CAST STEEL.

Established 1863

HUSSEY, BINNS & CO.  
MANUFACTURERS OF  
PLAIN BACK SOLID CAST STEEL SHOVELS  
(PAT. MAY 19, 1874 AND MARCH 30, 1875)  
OFFICE & WORKS: 27TH & RAILROAD STS. PITTSBURGH  
PA.

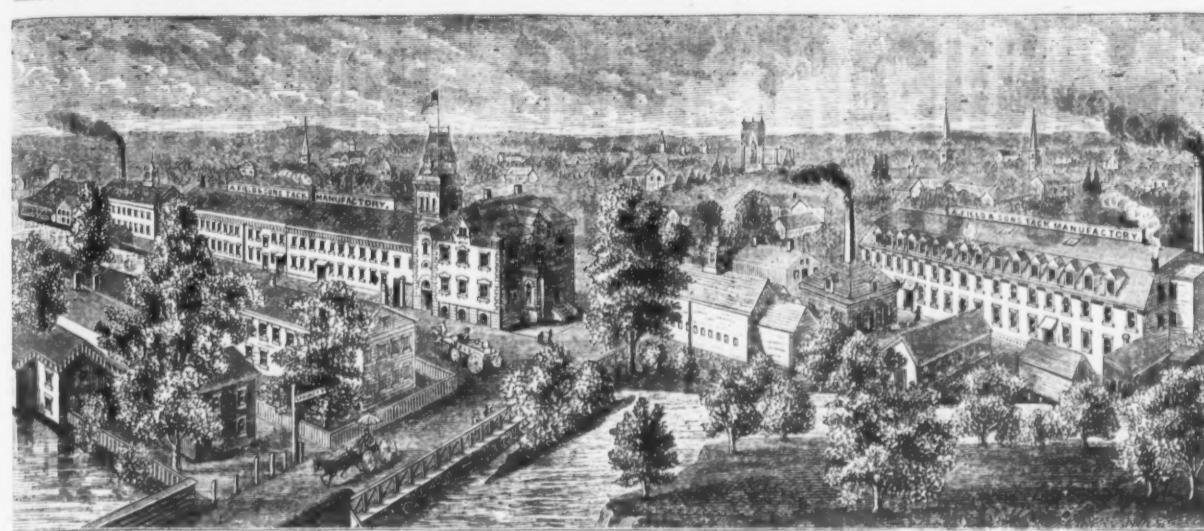
OLD COLONY IRON CO.,  
Taunton, Mass.,  
MANUFACTURE

Nails, Shovels, Spades, Scoops, &c.  
SOLID CAST STEEL GOODS MADE TO ORDER.

Warehouse, 211 Pearl St., N. Y.  
P. O. Box 1267.  
A. L. REID, Agent.

G. T. RICHARDSON,  
F. H. SCUDER,  
MIDDLEBORO'S SHOVEL CO.,  
MANUFACTURERS OF  
SOLID CAST STEEL (ANTRIM) CAST STEEL  
AND IRON SHOVELS, SCOOPS AND SPADES.  
OFFICE AND SALESROOM, 63 OLIVER ST. BOSTON.  
WORKS, MIDDLEBORO, MASS.

J. CLARK WILSON & CO. AGTS. BEEBE & CO., NEW YORK.



## A. FIELD & SONS, TAUNTON, MASS., Manufacturers of COPPER & IRON TACKS, TINNED TACKS,

SUPERIOR SWEDES IRON TACKS, for Upholsterers' Use, Saddlers' Supply, Card Clothing, etc., etc.

### American and Swedes Iron Shoe Nails,

Zinc and Steel Shoe Nails, Carpet, Brush and Gimp Tacks, Common and Patent Brads, Finishing Nails, Annulated Trunk and Clout Nails, Hob and Hungarian Nails, Copper and Iron Boat Nails, Patent Copper Plated Tacks and Nails.

Fine Two Penny & Three Penny Nails, Channel, Cigar Box & Chair Nails, Leathered Carpet Tacks, Glaziers' Points, Etc.

OFFICES AND FACTORIES AT TAUNTON, MASS. WAREHOUSE AT 78 CHAMBERS STREET, N. Y.,

where may be found a full assortment of Tacks, Brads, &c., for the accommodation of the New York Wholesale and Jobbing Trade.

Any variations from the regular size or shape of the above named goods made from samples, to order.

**Hoisting Machinery**  
Manufactured by  
Crane Bros. Mfg. Co.,  
CHICAGO.

COOKE & BEGGS, Agents, 16 Cortlandt Street, New York.



**SPRING BALANCES,**  
Patent Balances,  
Union & Counter  
**SCALES.**  
SPIRAL SPRINGS,  
Fenn's Faucets & Cork Stops.  
John Chatillon & Sons,  
91 & 93 Cliff St., N. Y.

### PRIZE MEDALLISTS:

London, 1862; Oporto, 1865; Dublin, 1865; Paris, 1867; Moscow, 1872; Vienna, 1873, and Highest Award and Medal at Centennial Exhibition, Philadelphia, 1876.

### CLARK & CO.,

Original Inventors and Patentees  
OF

Noiseless Self-Coiling Revolving  
STEEL SHUTTERS,  
FIRE AND BURGLAR PROOF.  
Also Improved

### Rolling Wood Shutters

Of various kinds. Clark's Shutters are the **Best** and **Cheapest** in the world. Are fitted to new Tribune Building, Lenox Library, Delaware and Hudson Canal Co.'s Building, Transatlantic Telegraph Co., U. S. Custom House, U. S. Post Office, &c., Posey County Court House, Mt. Vernon, Holt County Court, Oregon, Mo. Also to buildings in Boston, Cincinnati, Detroit, Janesville, Wis., Baltimore, Canada, &c. Have been for years in daily use in every principal city throughout Europe, and are installed by the **Leading Architects of the World.**

Office and Manufactory,

162 & 164 West 27th Street, N. Y.

ESTABLISHED 1858.



TRADE MARK, PATENTED.

PRINCE'S METALLIC PAINT,  
AN INDESTRUCTIBLE COATING FOR  
IRON, TIN, OR WOOD,

For Sale by the Trade and  
PRINCE'S METALLIC PAINT CO.,  
Manufacturers,

225 Pearl Street, New York.  
Caution.—As certain parties are offering for sale  
A SPURIOUS PAINT, under an imitation name,  
purchasers will please see that our TRADE MARK  
is on every package. None other genuine.

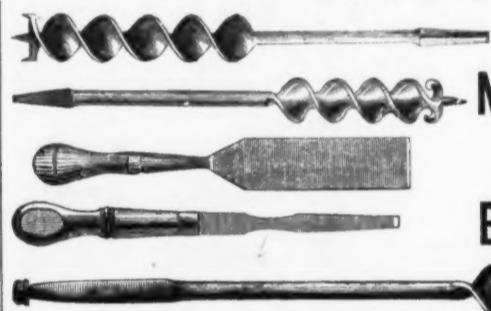
## THE DOUGLASS MFG. CO.,

New York Warehouse, 62 Reade Street. P. O. Box 2610.

FACTORIES, Seymour, Conn.

MANUFACTURERS OF

### PREMIUM Mechanics' Tools, COOK'S Boring Implements.



Chisels, Gouges and Drawing Knives of all kinds, Screw Drivers, Screw Driver Bits, Cook's and Douglass Mfg. Co.'s Augers & Bits, Wood and Metal Head Gimlets, Improved Hollow Augers, Blake's Patent Extension Bits, Boring Machines, Chisel Handles, Wood Boxes, Tool Chests.



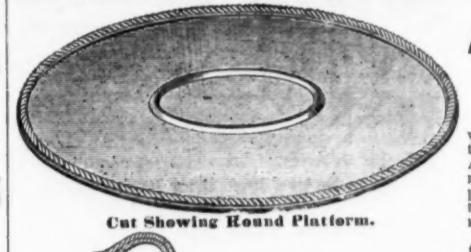
### ANSONIA CORRUGATED STOVE PLATFORM

Manufactured by the

Ansonia Brass & Copper Co.

Office, 19 & 21 Cliff Street,

NEW YORK.



The Ansonia Corrugated Stove Platform, with its heavy figured edge border, is believed to be the best Platform offered to the trade. As shown in the illustrated section herewith it requires no nailing to keep it in place or to prevent it from turning up at the edge; while the metal is of sufficient thickness to require no nailing.

The low price, superior quality and fine finish of this Platform will be readily acknowledged. Packed 100 in a case.

Send for price list.

### INDUSTRIAL ITEMS.

#### CONNECTICUT.

The Farrel Foundry and Machine Company, of Ansonia and Waterbury, are pushed with orders and running evenings. They have just added a large and powerful new engine lathe to their works in Waterbury. It is 6 feet swing, and a bed 22 feet long.

The Colt's Armory Works took advantage of the holidays to overhaul machinery, boilers, etc.

The Seth Thomas Clock Company, of Thomaston, are manufacturing a little time-keeper called the "Nutmeg" clock. It is very small and keeps perfect time regardless of the position it may be placed in. The company are turning them out at the rate of two hundred per day, and claim that they could dispose of 20,000 per week had they sufficient manufacturing capacity.

The British steamer King Arthur has been at New Haven loading with ammunition for the Turks. She has already taken on board 27 car loads from Bridgeport.

The Turkish government ordered 60,000,000 cartridges of the Winchester Arms Company, of New Haven, and within twelve weeks 30,000,000 of the number have been made.

A communication has been received by the Board of Trade from an Eastern manufacturer relative to the location of extensive works at Bridgeport, for the construction of engines, mill machinery, etc.

It is expected that the Wheeler & Wilson Factory, Bridgeport, will resume active operations early this month.

#### RHODE ISLAND.

The Providence Tool Company, at Providence, are putting aboard the steamer Lotus 70,000 rifles and as many bayonets and sabers, manufactured for the Turkish government, and the vessel will call at New Haven for metallic shells, and thence sail for Constantinople.

#### MASSACHUSETTS.

The Belcher & Taylor Tool Company, of Chicopee Falls, have declared and paid an 8 per cent. dividend, and elected the following officers: Directors: E. O. Carter, president, William E. Barrett, William P. McFarland, Henry A. Chase and Charles A. Taylor; clerk, James E. Taylor; agent and treasurer, George S. Taylor; auditors, Henry A. Chase and Charles A. Taylor.

The Ames Plow Company, of Worcester, now occupy two acres with buildings and stock in the northern part of the city, employ 160 men, make 300 styles of plows and other tools to match, and are at work on orders from Africa and South America. They have one building, four stories high, devoted to patterns.

They are producing at Brockton about 10,000 needles a day at the factory of Charles Howard & Co. These embrace about 20 different kinds, and are all for the standard sewing machines.

The Leominster Tool Company have been organized for the manufacture of horn-workers' tools.

The Douglas Axe Company report plenty of orders.

Work on the Emery testing machine, at the Ames Works, Chicopee, is going on rapidly, and it will probably be finished very shortly. This machine is one of the largest yet constructed, and contains many novel features intended to insure great accuracy in the results obtained. We shall watch the work of this machine with great interest.

The Taunton Iron Works Company have shut down to put in a new cupola, which will increase their capacity for melting iron.

#### NEW YORK.

The creditors of Swett, Quimby & Perry, of Troy, held a meeting Friday, the 22d ult., when a committee of five reported that the creditors would settle at 75 cents on a dollar. The firm have the offer under consideration, and will probably accept it.

Thirty-five of the forty puddling furnaces at Burden's Steam Mill on the flats, at Troy, are in operation. All the "trains" are running and one blast furnace.

#### PENNSYLVANIA.

The Valentine Iron Company, of Williamsport, has been reorganized, and capital and practical working force engaged of sufficient amount to undertake putting the rolling mill in first-class condition, with a view of making small sizes of iron for carriage bolts, sewing machine purposes and the like. The mill was burned down a short time since, but the heating furnaces and the iron working machinery were not so much damaged as to prevent their being put to use again.

The minerals of Clinton and Lycoming counties, embracing pipe clay, red hematite iron ore, silver glance (or black oxide of silver), a nickel bearing rock, and the conglomerate slates and marbles peculiar to the locality, are just now attracting attention, and there seems a prospect that considerable efforts will soon be made to develop these resources.

The iron works in the neighborhood of Pottsville suffer so far from the general depression as to desire to be counted out of a report in industrial news.

The Williamsport machinery manufacturers are anticipating a revival of business with the new year, and preparing themselves accordingly.

Waterman & Beaver, at Danville, are at present running one of their furnaces and half capacity on their rail mills. Groves Brothers, at the same place, are running but one. The iron trade in this part of the Susquehanna Valley is in a very depressed condition.

Robinson & Co., Tamaqua, have a fair share of orders for job, foundry and machine work.

The Tamaqua Rolling Mill Company are employed to a fair extent on merchant iron.

The manufacture of rails at Milton seems to have proved a good success, as the mill at

that place is running with an uninterrupted business.

The tannery of W. H. Reber, Milton, is now handling 250 hides per week. The stock is domestic slaughter, marketed in Philadelphia, in the sole leather and belting trade.

The manufacturing interests of the Susquehanna Valley are very much depressed.

Shimer & Co., at Milton, in connection with the production of shooks, cloth boards, etc., are making a grooving and tonguing head which is obtaining general celebrity with planing mills throughout the country.

The Milton Rolling Mill Company have resumed full time and the employment of a full complement of hands.

The car works of Murray, Dougal & Co., Milton, are reported to be in operation to their full capacity.

The Andrews Saw Works, at Williamsport, is near about idle, awaiting the opening of spring and summer trade.

Twenty-five employees at the Lehigh Valley Machine Shop, in South Easton, were suspended on the 3d instant.

The huge chimney at the glass works of Gilinder & Son, Philadelphia, fell with a tremendous crash on the morning of the 26th ult., doing damage to the extent of \$5000. The chimney was 100 feet high and 20 feet wide at the base. The accident was caused by allowing the fires to go out on Saturday, when the extreme cold weather contracted the bricks, thus rendering the supports inadequate to carry the immense weight of the chimney.

The new furnace of the Cambria Iron Company, at Johnstown, has gone into blast, and is working very satisfactorily, turning out about 70 tons of No. 1 Bessemer iron in 24 hours. It is constructed on a new plan, has a capacity of 125 tons, and is considered the finest and largest furnace in the United States.

The Pottstown Iron and Brass Foundry, after lying idle for some time, resumed operations on the 1st instant.

The Pottstown Iron Company had 10 of their ore cars damaged by a mishap on the Reading Railroad. The "monkey box" was also smashed. All will be repaired at once.

The Birdsboro nail factories were idle last week.

Hands are busily engaged in repairing the Gibraltar Rolling Mill.

We are pleased to note that Messrs. White & Sons, cutlery manufacturers, of Frankford, have opened a saleroom in Philadelphia, at 221 Market street, which it is expected will be quite a convenience to the trade, and also advantageous to the firm. We understand they are working full time, and with a full complement of hands are not more than keeping pace with their orders.

The Enterprise Manufacturing Company, Philadelphia, are running a full force of hands on full time, and are increasing their export trade. The demand for Mrs. Potts' sad irons, coffee mills, etc., is especially active. The firm has a large and steadily increasing demand from England for goods of their manufacture.

The New Castle *Courant* says five out of the seven furnaces in that city are now in full blast, and each turning out an average of about fifty tons of iron per day, or three hundred and fifty per week, making a grand total of seventeen hundred and fifty tons of iron per week made in New Castle alone. The Sophia Furnace, the first one built in New Castle, and the Little Pet, both small furnaces, are the ones standing idle. The Aetna Iron Works and the New Castle Sheet Iron Works are both running double turn.

The Reading Hardware Company is making extensive preparations to introduce improved machinery. A set of large duplex boilers will be put in place and a temporary engine house built. This will be followed by the erection of a 150 horse-power engine in the spring, when permanent buildings will be erected.

Employees of the Pottstown Iron Company's Works are cleaning the boilers, preparatory to a resumption of work.

It is rumored that the party who purchased the rolling mill at Blandon intends starting it up again.

Marietta Furnace No. 1 is in blast, and has been running since July, 1875. It is running on foundry iron, and has a capacity of 125 tons per week.

Reis, Brown & Berger's Rosene Furnace, at Newcastle, is soon to blow out after a continuous blast of three years and a half, in which time she has made over 75,000 tons of iron.

#### PITTSBURGH AND VICINITY.

The iron mills of Wilson, Walker & Co. are getting quite busy, and are now running full, with prospects for a heavy business in this year.

They have recently arranged for the manufacture of some new staple articles to be made by new and improved process.

The Crawford Manufacturing Company, manufacturers of malleable iron goods, are running their works to full capacity, with orders booked sufficient to keep them going rapidly for the next three or four months. They are now filling a contract for 300 tons of malleable castings. During the latter part of the past year they had to run their works double turn. They make specialties of agricultural implements and harness goods.

Messrs. Kloman, Park & Co. are employing at this time about 40 hands in the manufacture of axes and mining and railroad tools. Their prospects are good for a considerable increase of trade this year.

The Pine Creek Furnace, Allegheny Valley, is just ready to blow out, the lining being used up. It is filling an order for Byers, McCullough & Co., and will then go out.

The Edgar Thomson Steel Works were to resume, on January 2d, in all their departments, the workmen having accepted the reduction proposed in November last, which is in effect the same rates as paid at Johnstown. It was the refusal to accede to this reduction that led to the suspension.

It is stated that Messrs. Moorhead & Co., of the Soho Iron Works, have notified their employees of a 10 per cent. reduction, to take effect when the mill resumes. This will not affect the puddlers.

(Continued on page 18.)

## English Standard Wire Gauges



# RUSSELL & ERWIN MANUFACTURING COMPANY

## MANUFACTURERS OF HARDWARE.

Factories, NEW BRITAIN, CONNECTICUT, U. S. A.

Manufacturers' Agents and Dealers in General Hardware at our  
WAREHOUSES,

NEW YORK, - - - Nos. 45 and 47 Chambers Street.

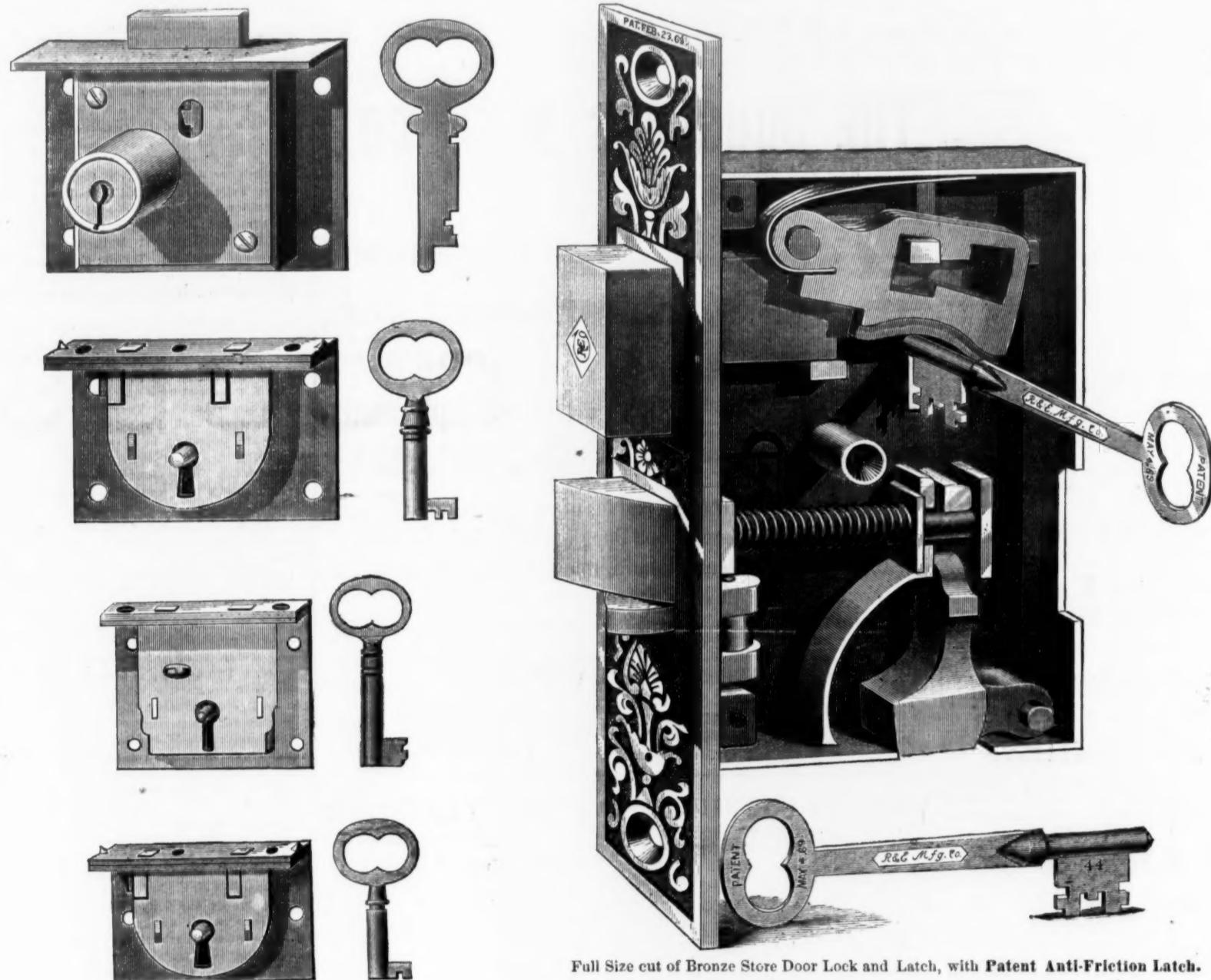
SOUTHERN DEPARTMENT,

PHILADELPHIA, - - - No. 425 Market Street.

BALTIMORE, MD., WM. H. COLE, AGENT, 17 South Charles St.



1/4 Size cut of Bronze Handle of Store Door Latch.



Full Size cut of Bronze Store Door Lock and Latch, with Patent Anti-Friction Latch.

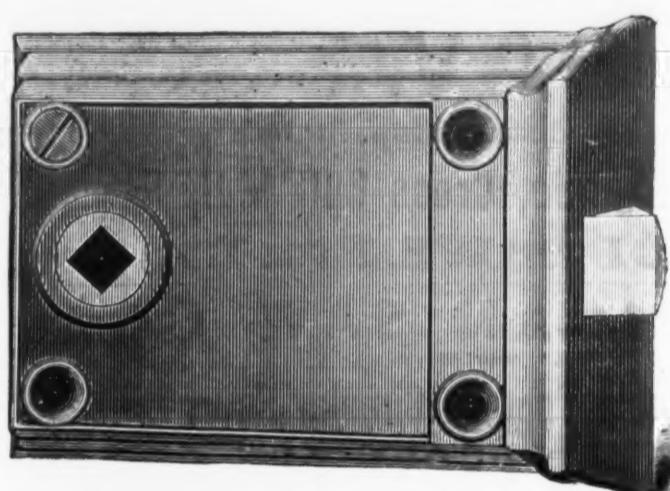
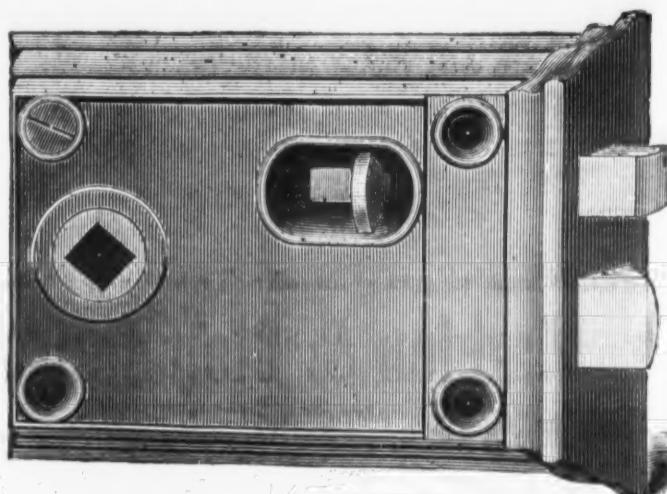
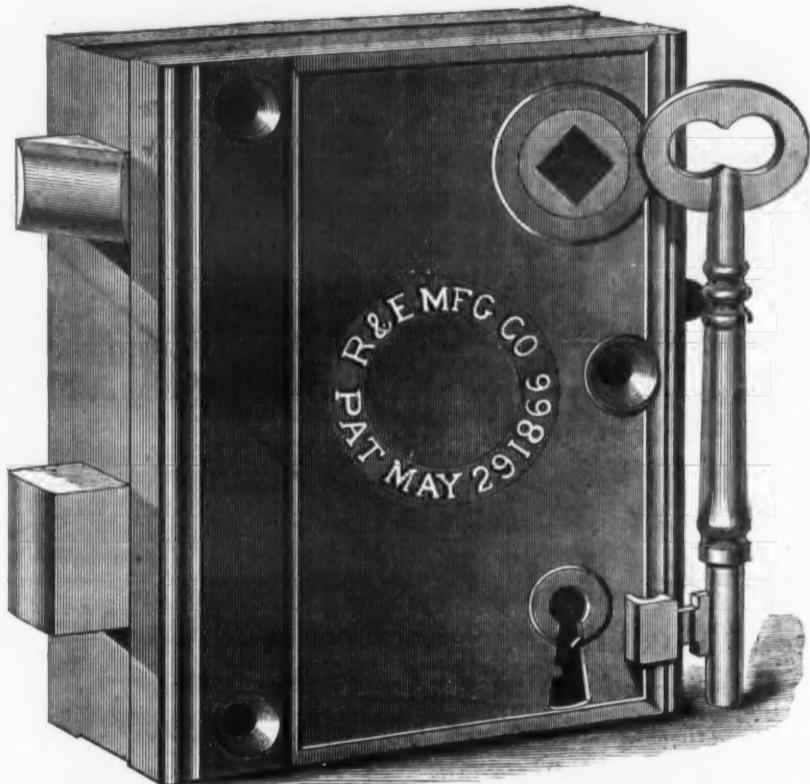
The action of the **ANTI-FRICTION LATCH** is sure and effective—doing away with all friction and jarring when closing the door. We shall also apply this latch to our Railroad Car, Front Door, and our better grades of Mortise Locks.

## CABINET LOCKS.

Our assortment of these goods is complete, and we can also supply a full line of "Eagle" and "Gaylord" Locks at manufacturers' prices. An **ILLUSTRATED CATALOGUE** will be issued at an early date. Parties can meanwhile order by either Eagle or Gaylord numbers.

# RUSSELL & ERWIN MANUFACTURING COMPANY

CONTINUED.



## NEW GOODS.

In consequence of the high prices established for Brass Bolt Rim Knob Locks and Latches, we have determined to place upon the market a new line of **BRASS-PLATED** goods, for which we solicit orders for immediate delivery. We shall increase our variety as occasion may require.

These goods are furnished with **BRASS-PLATED BOLTS** and **SOLID BRASS** Keys, and in make and finish are equal to our standard goods.

HOME UPRIGHT RIM KNOB LOCKS. PULL-OUT REVERSE.				HORIZONTAL RURAL KNOB LATCHES.			
No.	Size.		Without Knobs Per Dozen.	No.	Size.		Without Knobs Per Dozen.
B 861.	4 inch.	Janus face, 2 Brass-plated Bolts, Solid Brass Key, without Stop . . . . .	\$5.00	B 557.	3 1-2 inch.	Brass-plated Latch Bolt . . . . .	\$4.00
B 861 1-2.	4 inch.	Janus face, 2 Brass-plated Bolts, Solid Brass Key, with Stop . . . . .	5.25	B 552.	3 1-2 inch.	Brass-plated Latch and Slide Bolt . . . . .	5.00

Discounts, same as on our regular goods.

## SCREWS.

We are now producing from 5000 to 6000 gross per day of **FLAT HEAD GIMLET POINT SCREWS** of **QUALITY** and **FINISH** which we **GUARANTEE** to be **SUPERIOR** to that of any other Screws manufactured in the **WORLD**, and we invite a comparison under the **SEVEREST TESTS**.

Our prices will at all times be as low as those of any standard manufactures, and we solicit letters of inquiry for quotations before orders are given elsewhere.

Our Screws are all packed in our new Patent Paper Boxes bearing our labels on which are **LARGE FIGURES** denoting the **SIZE** and **NUMBER**.

## PEACE &amp; HOGAN, VULCAN SAW WORKS.

Manufacturers of every kind of

## Patent Ground Saws.



Circulars, Cross-Cuts, Mill, Mulay, Gang, Hand, and Butcher.

Molding and Planing Knives, Plastering Trowels, Mitering Rods, &amp;c.

Union Avenue, Tenth and Atwells Streets, BROOKLYN, E. D., N. Y.

OFFICE &amp; WAREHOUSE, 59 Beekman St., New York.

E. C. ATKINS.

ESTABLISHED 1857.

H. KNIPPENBERG.

E. C. ATKINS &amp; CO., Indianapolis, Ind., Saw Manufacturers and Repairers.

Sole manufacturers of the celebrated

GENUINE SILVER STEEL DIAMOND X CUT SAW.

\$1.50 Per Foot.



GAUGING THE CLEARERS

PATENT HANDLES AND GAUGES INCLUDED.

BEWARE OF THE IMITATION CALLED "DIAMOND TOOTH."

Wheeler, Madden &amp; Clemson MFG. CO., MIDDLETOWN, - - - NEW YORK.

Manufacturers of

WARRANTED CAST STEEL

## SAWS

Of every description, including

Circular, Shingle, Cross-Cut, Mill, Hand, WOOD SAWS. Etc., Etc.

AMERICAN SAW CO.,

Manufacturers of

Movable Tooled Circular Saws, PERFORATED CROSS-CUT SAWS

And SOLID SAWS of all kinds. Trenton N. J.

E. M. BOYNTON,

Manufacturer of all kinds of

First-Class Saws, Saw Frames, Cross-Cut Handles, Tools, Files, &amp;c. Also Sole Proprietor and Mfr. of the Genuine Patent Lightning Saw, No. 50 Beekman Street, NEW YORK.

Special attention is called to my new Centennial Saw, patented March 28th, 1876; Special Patent Saw, combined, patented June 20th, 1876; Cross Cut (Loop) Saw Handle, patented February 15th, 1876; New One-Man Saw, with Patent Double Removable Handle Attachment, March 28th, 1876; New Patent Champion Clearer Tooth, patented August 15th, 1876; Saw Set, patented Nov. 25th, 1873—a perfect set that a blind man can use to condense like a Hammer Set perfectly; Cross-bar Wood Saw Frame, patented Nov. 12, 1872; also Cross-Cut Handle, with castings, patented Feb. 15, 1870. These goods complete the scientific tools for cutting timber, instead of wearing it off with notched teeth (which are like a fractured plate sharpened).



AWARDED CENTENNIAL MEDAL AFTER ACTUAL TEST.

PHILADELPHIA, November 11th, 1876.

REPORT ON AWARDS. GROUP No. 15.

Product: Saws in great variety; special improvement in shape of teeth, called Patent Lightning Saw. Name and Address of Exhibitor: Eben Moody Boynton, New York.

The undersigned having examined the product herein described, respectfully recommends the same to the United States Centennial Commission for award, for the following reasons, viz:

DANIEL STEINMETZ, Signature of the Judge.

J. DIFENBACH, of Germany, DAVID McHARDY, of Scotland, D. STEINMETZ, of Phila. JUDGES.

A true copy of the record. FRANCIS A. WALKER, Chief of the Bureau of Awards.

Given by authority of the U. S. Centennial Commission. A. T. GOSHORN, Director General.

J. R. HAWLEY, Pres.

## FORT PLAIN SPRING AND AXLE WORKS.



FOR FALL TRADE.

All dealers in SPRINGS AND AXLES will find it to their interest to send to us for Price List and Discounts.

CLARK, SMITH &amp; CO., Fort Plain, N. Y.

TURNED MACHINE SCREWS.

One-sixteenth to five-eighths diameter.

Heads and points to sample.

IRON, STEEL and BRASS.

Lyon &amp; Fellows Mfg. Co.,

Cor. 1st and North 3d Streets, Williamsburg, N. Y.

W. C. BARKER &amp; CO., Iron, Steel, Nails, HEAVY HARDWARE, WAGON AND CARRIAGE MATERIAL, DRILLS, ANVILS, BELLows, VINES, CHAINS, &amp;c.

CHICAGO ILLS.

## IRON BLOCK PLANE.

1-2 Inches Long, 1-3-4 Inch Cutter, \$9.00 per dozen.



STANLEY RULE AND LEVEL COMPANY, Manufacturers' Factories, New Britain, Conn.

Warehouses, 35 Chambers St., N. Y.

## Philadelphia "STAR" Bolt Works.

NORWAY IRON



FANCY HEAD BOLTS,

Carriage &amp; Tire Bolts. Star Axle Clips, &amp;c.

TOWNSEND, WILSON &amp; HUBBARD, 2301 Cherry St., Philadelphia, Pa.

TUCKER &amp; DORSEY, MANUFACTURERS.

Agents, GRAHAM &amp; HAINES, 113 Chambers &amp; 95 Race Sts., N. Y.



"TUCKER'S ALARM'S TILL MFG. CO. INDIANAPOLIS, INDIANA."



## COLEMAN EAGLE BOLT WORKS.

ESTABLISHED 1845.

The Original and Only Establishment Manufacturing the Genuine Coleman Eagle Bolt.

Made of Best Quality

SQUARE NORWAY IRON.

## WELSH &amp; LEA,

Successors to M. J. COLEMAN.

WORKS, Columbia Avenue, Hancock and Mascher Sts.

OFFICE, 145 Columbia Avenue (late 2030 Arch St.),

PHILADELPHIA.

## CARRIAGE BOLTS.

Buy the Best.



Clark's Patent Carriage Bolt.

Best Bolt manufactured for all kinds of agricultural machinery. Will not split the wood, and cannot turn in its place.

MANUFACTURED BY

CLARK BROS. &amp; CO., Milldale, Conn.

Also Manufacturers of

Plow and Machine Bolts, Coach Screws, Nuts, Washers, Tire Blanks, Rivets, etc.

Send for Illustrated Price List.

## HOOPES &amp; TOWNSEND, PHILADELPHIA.



## "Keystone" Boiler Rivets, BRIDGE &amp; SHIP RIVETS.

ESTABLISHED 1855.

## Philadelphia Rivet Works, CHARLES B. ALLEN,

Seventeenth and Hamilton Streets,

PHILADELPHIA.

The undersigned begs leave to inform his former customers, consumers of and dealers in rivets generally, that he has resumed the manufacture of

BOILER, BRIDGE and SHIP RIVETS,

at the above location, where he will keep constantly on hand a large assortment of all the regular sizes.

Special sizes made to order.

Particular attention paid to the selection of the best quality of iron. A share of your patronage will be thankfully received.

Yours, respectfully,

CHAS. B. ALLEN.

## A Fact. Jobbers &amp; Dealers in CARRIAGE AXLES

Buy Goods of the

## Best WARRANTED material FOR THE LEAST MONEY OF THE

## CLEVELAND AXLE MFG. CO.

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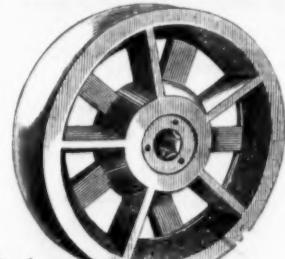
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 authorized to receive them, and not to throw them into  
 hallways or upon stairs; and it is our desire and intention  
 to enforce this rule in every instance.

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### Our Export of Hardware and Ma- chinery.

The prospect held out to our export  
 trade for the year just begun is rather en-  
 couraging than otherwise. Many of the  
 dealers abroad have visited the Centennial  
 and extended relations among us, having  
 had an opportunity to compare our goods  
 with those of other manufacturing coun-  
 tries; seen the works of many of the firms  
 and made the personal acquaintance of  
 owners. Many who till now gave the sub-  
 ject little attention have perceived clearly  
 that our goods have a great future abroad  
 in competition with those of European  
 manufacture, and during the past twelve

months various Eastern houses have estab-  
 lished branches or agencies on the Conti-  
 nent and elsewhere for the purpose of  
 studying the requirements of consumers  
 with reference to what we produce or are  
 capable of turning out. If unforeseen  
 political events do not occur in the  
 countries with which we are thus re-  
 lated, it is fair to presume that our  
 business with them will be materially in-  
 creased during the current and ensuing  
 years, and that we shall then have a better  
 outlet for our large manufacturing ca-  
 pacity.

In thus striving to conquer new fields,  
 our principal attention will have to be  
 directed to retaining the good reputation  
 we have earned as to quality, finish  
 and packing, while contenting ourselves  
 with minimum profits. In the Spanish-  
 American countries, including the repub-  
 lic, our trade in 1875 and 1876 has  
 been much hampered by revolutions  
 and financial disasters; from the latter  
 even Brazil has not been exempt, but  
 gradually the political status of those  
 countries is relapsing into quietude, if we  
 except Mexico and Cuba, still in the midst  
 of trouble. In Australasia and at the Cape  
 we have made good progress, and are su-  
 perseding European edge tools, saws and  
 implements steadily in those markets. The  
 London *Mining Journal*, in a leader, cites  
 the following incident:

A customer of a Birmingham mercantile firm,  
 on his way from New Zealand to England,  
 called at a large American saw manufactory,  
 and being pleased with the samples shown him  
 inquired the prices. The quotations were  
 rather too high, and the visitor remarked that  
 he thought that he could do better in Sheffield.  
 "What price can you pay?" inquired the man-  
 ufacturers? The desired limits having been as-  
 certained, the foremen of the different shops  
 were called and frankly told the circumstances.  
 The men then had a brief consultation to-  
 gether, and returned to the office with the cur-  
 rent acceptable and wise reply: "We will meet  
 you on the terms offered." The order, which  
 was a valuable one, was, consequently, left at  
 New York instead of coming to Sheffield. The  
 buyer in this case has been a regular customer  
 with Birmingham and Sheffield for 10 or 12  
 years past. His orders for saws are now wholly  
 lost to this country.

In Germany and Russia our goods have  
 been making headway steadily. For war  
 purposes we have furnished for two years  
 past large amounts of raw copper, cart-  
 ridges, artillery, guns, &c., to Russia, Turkey  
 and the Western Continental  
 nations.

The important abolition of import duties  
 on iron, steel and their manufactures in  
 Germany attracts the attention of all com-  
 peting nations, and, by way of experiment,  
 many shipments will be made to that  
 country henceforward. To what extent  
 this will practically interest ourselves re-  
 mains to be seen.

On glancing over the entire field it  
 seems to us full of promise and well worthy  
 the serious study of those who have hitherto  
 confined themselves more exclusively to  
 our own country and Canada. We pos-  
 sess the material, an advantageous geo-  
 graphical position, unlimited commercial  
 opportunities, and an enviable prestige.

### The Outlook in the Metal Trade.

The general elements contributing to  
 prosperity in the metal trade have in many  
 respects improved. Stocks in the hands of  
 the trade and consumers are conceded to  
 be much lighter than they were a year  
 ago. Those in first hands are decidedly  
 so. At the same time prices are, on the  
 whole, materially lower, as the following  
 figures will show:

#### Stocks and Prices on this Coast January 1.

	1874.	1875.	1876.
January	\$22,658,092	\$15,581,948	\$21,146,814
February	20,706,412	22,152,569	22,308,309
March	25,441,272	25,912,247	26,308,309
April	26,161,301	26,619,533	27,179,363
May	35,657,948	29,869,772	30,085,396
June	36,355,067	41,996,186	28,010,567
July	33,207,739	27,119,188	20,083,079
August	33,043,056	31,594,492	23,986,716
September	31,371,083	24,510,040	23,529,549
October	25,894,447	21,888,478	20,468,474
November	24,256,272	25,119,293	23,194,566
December	24,735,866	21,885,670	31,931,863

Total. .... \$383,679,451 \$340,656,569 \$305,464,638

The total exports from this port during  
 the same triennial period are shown in the  
 following table:

	1874.	1875.	1876.
January	\$26,116,146	\$29,410,728	\$23,668,625
February	23,706,473	22,152,569	22,308,309
March	25,441,272	25,912,247	26,308,309
April	26,161,301	26,619,533	27,179,363
May	35,657,948	29,869,772	30,085,396
June	33,781,928	19,786,016	20,052,833
July	35,275,416	24,403,223	22,060,231
August	31,901,166	24,221,010	26,465,688
September	23,912,247	25,758,998	26,169,686
October	25,900,305	23,783,198	24,393,679
November	24,436,833	25,487,940	25,597,408
December	26,002,437	25,967,012	30,059,595

Total. .... \$345,162,361 \$324,018,818 \$318,618,066

These totals include specific imports and  
 foreign re-exports. The exports of domestic  
 products from New York were as follows:

	1874.	1875.	1876.
January	\$20,610,679	\$21,146,814	\$21,146,814
February	23,706,473	22,152,569	22,308,309
March	25,441,272	25,912,247	26,308,309
April	26,161,301	26,619,533	27,179,363
May	35,657,948	29,869,772	30,085,396
June	33,781,928	19,786,016	20,052,833
July	35,275,416	24,403,223	22,060,231
August	31,901,166	24,221,010	26,465,688
September	23,912,247	25,758,998	26,169,686
October	25,900,305	23,783,198	24,393,679
November	24,436,833	25,487,940	25,597,408
December	26,002,437	25,967,012	30,059,595

mistake. It is probable that Bessemer wire would have answered, but in structure of this character the best material obtainable should be used, without regard to the possible saving of \$150,000 or so on first cost.

#### The Protest of the Steel Manufacturers.

On page seven of this issue will be found a protest of the steel makers of the country addressed to Mr. James M. Swank, secretary of the American Iron and Steel Association. The protest grows out of the discussion of the question of how certain grades of steel of low carburization should be classified for appraisement by the customs inspectors. It appears that lots of such steel have been entered at the port of Boston as iron, and against a continuance of this practice the steel manufacturers of the country make a vigorous remonstrance, supported with a number of good reasons why such grades of metal should not be entered as iron. Boston collectors of customs have a reputation for liberality, amounting almost to looseness, in the appraisement of steel which is very satisfactory to the importers, no doubt, but not altogether in accordance with the letter or spirit of our revenue laws. We admit that the importer should be allowed all the advantages he can claim under a fair, and even a favorable, interpretation of the law, but when he is permitted to bring in steel as iron and pay duty accordingly, he gets rather more advantage than is wholesome, and a great deal more than he has any right to expect. If our law imposes too high a duty on low steels, that is one thing; but to permit their importation as iron is quite another.

#### Meeting of Stove Manufacturers.

(*Special Dispatch to The Iron Age.*)

TROY, N. Y., Jan. 17, 1877.

The National Association of Stove Manufacturers opened its sixth annual session in this city to-day, the president, Mr. S. S. Jewett, in the chair. The attendance is very large. The president read an important address, after which the election of officers for the ensuing year took place, resulting in the re-election of the old officers. The question of long credits and other abuses of the trade was discussed at some length, and important action is expected during the session to-morrow. This afternoon at 3 o'clock the members were entertained at the Troy Club House.

For some time past our manufacturers of war materials have been in receipt of large orders from both Russia and Turkey for small arms and cartridges. Russia is also taking our machinery. A set of American rifle machines has been set up in one of the Russian arsenals and is now being driven to its capacity. The number already manufactured in Russia by machinery purchased by General Gortoff from Colt's Rifle Company is estimated at 3,000,000. Russia has also, during the past year, imported from another American firm 100,000 pistols. There has likewise been perfected in America what is now called the Russian cartridge—20,000,000 of which have been made in Bridgeport, Connecticut. Cartridge machinery has also been sent from America to Russia, and 400,000 cartridges are being manufactured daily at St. Petersburg and Moscow. The Turkish government have entered into a contract with the Rhode Island company for the supply of 800,000 Martini-Henry rifles, of which 250,000 have already been shipped, 100,000 more are ready for export, and materials for another 100,000 are on hand at the works. It looks now as if America had become the world's armory. In the event of a general war in Europe, or even of a general war preparation, we should be overcome with orders which it would tax even our own large capacity to fill.

The annual circular of Dunn, Wiman & Co., of Montreal, commercial agents, shows that the commercial stagnation has been very severely felt in Canada. In 1876 the failures amount one for every thirty-two persons doing business in Canada and the provinces. In the United States the ratio was one to sixty-nine. The cause of this state of affairs in Canada is said to be overtrading. There has been an undue crowding of the distributive industries and a proportionate withdrawal of capital and labor from production. Added to this we have the failure of crops this year in the principal agricultural districts north of the great lakes, which has deprived a large part of the population of the means of purchasing to the extent of their average requirements. Trade is dull enough here, but it must be a great deal worse with our neighbors.

From the analogy in chemical properties, existing between the metals nickel and cobalt, it has been thought probable that by employing in the battery the cobalt compounds corresponding in chemical constitution to those successfully employed in the process of nickel-plat-

ing, a similar deposition of cobalt should be obtained. This has been confirmed by the *Jahresbericht d. phys. Vereines in Frankfurt*, where it is affirmed the most beautiful cobalt plating may be obtained upon brass and copper, by employing in the battery—with two Bunsen cells—a moderately concentrated solution of the double chloride of ammonium and cobalt. This solution is prepared by dissolving 40 grammes of crystallized chloride of cobalt, and 20 grammes of chloride of ammonium, in 100 cubic centimeters of water, with the addition of 20 cubic centimeters of ammonia. This cobalt deposit takes place rapidly, and attains in a short time such a thickness that a magnetic needle is decidedly affected by it.

#### Furnace Capacity and the Outlook for the Iron Trade.

To the Editor of *The Iron Age*—DEAR SIR: A somewhat extended intercourse with "iron men," and particularly since the effects of the last three years' depression have been most severely felt, has caused your correspondent to notice so distinctly the difference between the practical and the ideal "iron men," that he believes you will not object to giving him a hearing on a point of the most vital interest to the trade.

Shall we assert that the trade was overdone, and the most substantial and reliable portion of it brought to that state of dependency which it now occupies by enthusiasts who were not fitted for the business? Why not?

Do not most of the long established producers remember the frequent consultations which were held during 1870, '71 and '72, which consultations resulted in the decision that business was going ahead too rapidly?—that the means of production were being created far more rapidly than the demands of consumption required? and that it was but a question of time how soon the activity then prevailing would receive a disastrous if not a fatal check?

Then the question occurs, If these are the facts, how has it transpired that the production, and the facilities for the production of iron in its various commercial forms, have become too great for the wants of this country, or to make the business profitable? The writer takes the privilege of saying briefly that the disaster (or give it any other name, if you please) was largely added if not entirely precipitated by the addition to the working force of men and capital which before had not been connected with the work, and which for want of knowledge of the work failed to comprehend its true nature and extent. But being attracted by the dignity and commanding position of ironmasters, and being ambitious to lead while the power seemed to be in hand to obtain a leading position, this element stepped into the practical ranks in such manner as to at first stimulate and later depress the business by a surplusage of power.

Thus it will be remembered that capital which could not before be employed in the iron business, and the energies of men new to it, became the agencies by which furnace and rolling mill power was increased, by which new iron mines were opened, and the management of these enterprises was attended by an enormous additional cost.

Herein was the mistake, from first to last; and it seems the most wonderful thing in the history of so great an interest in any country, that, though discovered and promulgated by a few, it was not made the guide for all, and that the fiction should not have been checked before it reached the magnitude which finally caused so complete an overthrow of the entire interest. The other continent shared with this one in the enthusiasm, which was probably the great stimulant that actuated the sudden employment of so much additional capital in the business in this country; and that content now coming to and sharing the same grief with this makes the case one to be more greatly deplored, whether for want of knowledge, due enthusiasm, or a prevailing love for fiction than for truth.

In large, general works, however, such as a rolling mill and nail factory or large machine works or large railroad shops, both the maker and worker of the steel labor under great disadvantages from want of a mutual understanding.

The steel maker receives his order and fills the sizes of tempers best adapted to general work, and the smith usually tries to harden all tools at about the same heat. The steel maker is right, because he is afraid to make the steel too high or too low for fear it will not suit, and so he gives an average adapted to the size of the bar.

The smith is right, because he is generally the most hurried and crowded man about the establishment. He must forge a tap for this man, a cold nail knife for that one, and a lathe cutter for another, and so on; and each man is in a hurry.

Under these circumstances he cannot be expected to stop and test every piece of steel he uses and find out exactly at what heat it will harden best and refine properly.

He needs steel that will all harden properly at the same heat, and this he usually gets from the general practice among steel makers of making each bar of a certain temper, according to its size.

But if it should happen that he were caught with only one bar of, say, inch and a quarter octagon, and three men should come in a hurry, one for a tap, another for a punch, and another for chilled roll plug, he would find it very difficult to make one bar of steel answer for all these purposes, even if it were of the very best quality.

The chances are that he would make one good tool and two bad tools; and when the steel maker came around to inquire he would find one friend and two enemies, and the smith puzzled and in doubt as to whether he ought to get mad or not.

There is a perfectly easy and simple way to avoid all of this trouble, and that is, to write after each size the purpose for which it is wanted, as for instance: Track tools, smith tools, lathe tools, taps, dies, cold nail knives, cold nail dies, hot nails, hot or cold punches, shear knives, &c., &c. This gives very little trouble in making the order, and it is the greatest

years ago, the absolute demand for iron is not much if any less on account of the substitutes for pig.

The facts are—and the sooner they are realized the sooner will the trade be benefited—the pig and rolling mill capacity is far too great for the demands of the country, and it is safe to predict that so far as the furnaces are concerned, not more than one half of them now standing will ever again be used at a profit.

The large and elaborate furnaces must take precedence of the smaller ones, on account of their greater capacity; the smaller ones must also give way to the advantages which capital can influence against them in the obtaining of raw material. And, all in all, it cannot be proved, through any evidence now foreseen, but that the iron business is not in as fair a condition as it deserves, considering the abuse which has accompanied its management, nor but that the concerns which can run at all ought not to be thankful that they are not of the general wreck.

IRONMASTER.

On the Temper of Steel.

Messrs. Miller, Metcalf & Parkin, in their "New Year Circular," just issued, give the following useful hints on the temper of steel:

Since the issue of our circular showing the proportions of carbon in our steel, and that the relative amounts of carbon in any ingots could be determined accurately by inspection, we have received inquiries which lead us to believe that it would be advisable to give some explanations of temper, and also of tempering.

The word temper, as used by the steel maker, indicates the amount of carbon in steel; thus, steel of high temper is steel containing much carbon; steel of low temper is steel containing little carbon; steel of medium temper is steel containing carbon between these limits, &c., &c. Each number of our carbon circular represents a temper, and beside these numbers we use intermediate ones, amounting to some twenty in all. As the temper of steel can only be observed in the ingot, it is not necessary to the needs of the trade to attempt any description of the mode of observation, especially as this is purely a matter of education of the eye, only to be obtained by years of experience.

The act of tempering steel is the act of giving to a piece of steel after it has been shaped the hardness necessary for the work it has to do. This is done by first hardening the piece, generally a good deal harder than is necessary, and then toughening it by slow heating and gradual softening until it is just right for work.

A piece of steel properly tempered should always be finer in grain than the bar from which it was made. If it is necessary, in order to make the piece as hard as is required, to heat it so hot that after being hardened it will be as coarse or coarser in grain than the bar, then the steel itself is of too low temper for the desired work.

In a case of this kind the steel maker should at once be notified of the fact, and could immediately correct the trouble by furnishing higher steel.

If a great degree of hardness is not desired, as in the case of taps and most tools of complicated form, and it is found that at a moderate heat the tools are too hard and are liable to crack, the smith should first use a lower heat in order to save the tools already made, and then notify the steel maker that his steel was too high, so as to prevent a recurrence of the trouble.

In all cases where steel is used in large quantities for the same purpose, as in the making of axes, springs, forks, &c., there is very little difficulty about temper, because, after one or two trials, the steel maker learns what his customer requires and can always furnish it to him.

In large, general works, however, such as a rolling mill and nail factory or large machine works or large railroad shops, both the maker and worker of the steel labor under great disadvantages from want of a mutual understanding.

The steel maker receives his order and fills the sizes of tempers best adapted to general work, and the smith usually tries to harden all tools at about the same heat. The steel maker is right, because he is afraid to make the steel too high or too low for fear it will not suit, and so he gives an average adapted to the size of the bar.

The smith is right, because he is generally the most hurried and crowded man about the establishment. He must forge a tap for this man, a cold nail knife for that one, and a lathe cutter for another, and so on; and each man is in a hurry.

Under these circumstances he cannot be expected to stop and test every piece of steel he uses and find out exactly at what heat it will harden best and refine properly.

He needs steel that will all harden properly at the same heat, and this he usually gets from the general practice among steel makers of making each bar of a certain temper, according to its size.

But if it should happen that he were caught with only one bar of, say, inch and a quarter octagon, and three men should come in a hurry, one for a tap, another for a punch, and another for chilled roll plug, he would find it very difficult to make one bar of steel answer for all these purposes, even if it were of the very best quality.

The chances are that he would make one good tool and two bad tools; and when the steel maker came around to inquire he would find one friend and two enemies, and the smith puzzled and in doubt as to whether he ought to get mad or not.

There is a perfectly easy and simple way to avoid all of this trouble, and that is, to write after each size the purpose for which it is wanted, as for instance: Track tools, smith tools, lathe tools, taps, dies, cold nail knives, cold nail dies, hot nails, hot or cold punches, shear knives, &c., &c. This gives very little trouble in making the order, and it is the greatest

relief to the steel maker. It is his delight to get hold of such an order, for he knows when it is filled that he will hardly ever hear a complaint.

Every steel maker worthy of the name knows exactly what temper to provide for any tool, or if it is a new case one or two trials are enough to inform him, and as he always has all of his twenty odd tempers on hand it is just as easy and far more satisfactory to both parties—to have it made right as to have it made wrong.

For these reasons we urge all persons to specify the work the steel is to do, then the smith can harden all tools at about the same heat, and he will not be annoyed by complaints or hints that he does not do his work well.

Please hand this to your smith and ordering

man for preservation, and we will follow it shortly with some of the results of our experience in hardening and tempering various sizes and forms of tools.

#### Another Failure of the Block System.

The London *Engineer* comments as follows upon the latest failure of the block system:

The block system has once more failed a railway company in their need; and a disastrous accident is the result. On the 23d of December the down Great Northern express train when near Arlesey, 35 miles from London, ran into a coal train. The driver and stoker jumped off and were both killed on the spot, and the train was thoroughly smashed up and both lines blocked. The coal train came to be in the way in this wise. At 3:30 p. m. it arrived at Arlesey, and the signalman, having blocked both lines, which he could not help doing, at once proceeded to shunt it into a siding out of the way of the express. All would have gone well, but that unfortunately some trucks got off the rails, and so the train fouled the down line. The moment the signalman found this he rushed to his telegraph instrument to warn the signalman at Cadwell, about two miles off, but at the same moment the Cadwell man gave "train on line." As both the home and distant signals at Arlesey were at danger, there was apparently no ground for apprehension. But it would seem that the signalman at Arlesey had small faith in the machinery which he operated, for he snatched up a red flag, threw it to a plate layer, and told him to run up the line as fast as he could and stop the express. We shall say nothing of the compliment thus paid to an elaborate and costly signalling apparatus. An experienced man—he was signalman at Arlesey for eight years—placed more confidence in a red flag than he did in his semaphores. However, the plate layer had not time to be of use, and the train dashed through the signals, and the accident occurred.

An inquest and a Board of Trade inquiry before Capt. Tyler are both in progress, so that we are not at liberty to pronounce any decided opinion as to the cause of the accident; but there are certain facts available which the journalist may as safely and as prudently use now as in a year hence. We shall proceed to point these out. In the first place, the Great Northern line is worked on the absolute block system, with interlocking gear, and consequently this accident should not have occurred. In the second place, Mr. Cockshot, the general manager of the line, was on the platform when the train started, and specially warned poor Pepper, the driver, a man of large experience, to be careful, as it was Christmas time. In the third place, it seems that Pepper was careful, for, although the accident happened, he was heard whistling for brakes long before—seconds are long at such moments—the smash. It will be seen further, that in this case we have none of the old elements of doubt. The signalman had done his best. The semaphores were put at danger. All that the block system could do to prevent an accident, it had done, and an accident took place. Whenever the block system fails, an excuse is found for it. At Abbott's Ripton a snow storm was in fault; in other instances the signalman is to blame. Here only two causes can be assigned for the accident. Either the driver and fireman of the express did not see the signals against them, or, seeing them, they were unable to stop the train in time. As they were both killed it is impossible to hear their evidence.

Now, we have not the slightest doubt that the advocates of the block system will say that the system is perfect, but that its utility was impaired by the neglect of the driver. But the utility of the block system is constantly being impaired in this way by the neglect of drivers and signalmen, and by snowstorms, and want of oil, and the stretching of wires, and other adverse influences too numerous to mention—impaired so much that many railway men begin to believe that it is incapable alone of preventing accidents. In the case of the Arlesey collision it will be seen that an admirable parallel may be found for that at Abbott's Ripton. In each the signalman endeavored to throw the work of stopping the train rushing to destruction, on the man just before him in the direction in which the train was coming. Thus, at Abbott's Ripton signalman had been in time, it is assumed no accident would have occurred; and in the same way Graves, at Arlesey, tries to stop, at Cadwell, the train which he fears. Now, if the system really worked, as it is claimed for it that it does work, then each man ought to be able to act for himself, and Graves ought to have been quite certain that he could stop the train. That he was not certain is proved by his sending a plate layer to supplement his signals, and that his fears were justifiable is proved by the collision.

It will be urged that the collision took place because too short an interval intervened between the shunting of the goods train and the arrival of the express. The sooner this line of argument is dismissed forever from the pages of the press the better; and we are pleased to find the *Times* taking the sensible and accurate view, that short intervals of time only can be allowed for shunting on crowded lines. A system of working trains which will not permit short intervals of space between each train is useless. We are by no means disposed to assert that the block system is so bad that it should be dispensed with, and that railway men should resort to the old time interval, keep a good look out for tall lights, and trust in Providence. But we do reassert here what we have asserted before, that the block system requires to be supplemented by something else, and that the misplaced confidence which has been placed in the exaggerated merits of the device has done a great deal to retard the progress of improvement in the working of railways. It has now been proved by four great accidents—that at Abbott's Ripton, that at Thorpe, that at Radstock, and now this at Arlesey—that the block system must, to be efficient, be supplemented by some satisfactory method of stopping a train. The signals can only tell drivers to stop, and are worse than useless if these cannot stop, because they lull men into a false security. Until all the facts are before us it is impossible to say whether any continuous brake would have obviated the Arlesey collision. But it is at least possible to prove that the speed of the train would have been greatly reduced. In the same way at Abbott's Ripton lives would have been saved, and thousands of pounds of property preserved to the company, if the down express had been fitted with a continuous brake. Dozens of examples of the same truth may be cited by any railway man who has his notes by him. The only question now remaining to be dealt with is, How many more collisions are to take place before railway companies begin to understand that when they have provided powerful engines to haul a train at high speed they have done but half their work, and that an efficient means of taking the velocity out of the train in the smallest possible space of time is just as much needed?

#### Rattening in the Sheffield Saw Trade.

The *Ironmonger* says: The most glaring case of rattening that has been known in Sheffield since the Trades' Outrage Commission sat there in 1867, has been committed this month. It is matter of history that the notorious William Broadhead was the secretary of the Saw Grinders' Union, and that it was in connection with this trade some of the most diabolical outrages that disgraced the town were committed. Again the alleged action of that union has attracted public attention. Messrs. Yates & Wood, saw manufacturers, whose works are in Wicker Lane, have in their employ a man named Thomas Peace. Work is given out to him, and he employs his own men to help him to do it. He has had working for him two union men, a unionist named Broadhead, relative of the well known William, and an apprentice. Formerly Peace himself belonged to the union, but he severed his connection with it. After standing aloof for a time he applied to know on what terms he might be reinstated a member. He was told by paying a year's subscription a year in advance, and renouncing unentitled to any benefit until that period had expired. He refused to submit to those terms, and only once since then has he had any communication with the union, and that was in regard to some unpleasantness with respect to his apprentice. When he went to his work on the morning of December 12 he found that his "wheel" had been entered during the night, and the two long leather bands which drove his machinery had been taken away. A third band which a unionist used had been removed, but was left in the yard. Now it happened that the bands were the property of the firm, and Mr. Wood had Peace and his men before him, and interrogated them as to why they had been taken. They were quite unable to give any explanation, alleging that no communication whatever had passed between them and the union. Mr. Wood appeared to take it for granted that the union was at fault in the matter, and he complained that the bands should have been taken and no reason assigned. The same night two of the men went before the officials of the union and repeated his complaint, and the next morning's post brought Mr. Wood the following expiation:—"dear Sirs,—With reference to your Bands the Bands have been taken for the prentice lad and Thomas Broadhead, Yours truly Mary Ann." On the other side of the sheet was the following: "

**TACKS, LINING, SADDLE NAILS**

AMERICAN TACK CO. Factory at Fairhaven, Mass. N. Y. Salesroom, 117 Chambers Street.

ANY SIZE OR STYLE OF TACK MADE FROM SAMPLE TO ORDER.

PATENTED

St. Louis Stamping Co.

**GRANITE IRON WARE**

MAY 30, 1876.

St. Louis, Mo.

All Goods Marked

FOR SALE

Granite Iron Ware.

EVERYWHERE.

GRANITE IRON WARE IS THE ONLY SUITABLE HOUSEHOLD WARE MADE.

THE VICTOR PLANES

Are the most simple, compact and practical Adjustable Planes ever offered to the public. They are made under the personal supervision of MR. L. BAILEY, the original inventor of L. BAILEY'S PATENT ADJUSTABLE IRON PLANES. All our Planes have our Trade Mark. Send for Catalogue, contracts, Planes, Try Squares, Bevels, Rules, Levels, Hammers, Mitre Boxes, etc., etc.



WILSON MANUFACTURING COMPANY.,  
NEW LONDON, CONN.

MANUFACTURERS OF

**SOLID BOX VISES.**

With or without Convex and Concave Washers.

Jackscrews, Braces, Coffe Mills, Turning Lathes; Clamp Heads and Screws, Parallel Bench Fises, Sash Pulleys, Hit House Pulleys, Composition Clocks, Bench Screws, Vise Screws, Gridirons, Drill Stocks and Boxes, Box Chisels, Rivets, Sheaves, Block Pins, Composition Roller and Iron Bushings, Riggers' Screws, Caulkers' Tools, Pump Chambers, Belaying Pins, Martin Spikes, Malleable Iron Castings, and General Hardware.

GALVANIZING DONE TO ORDER.

WILSON MFG. COMPANY,  
Warehouse, 97 Chambers and 81 Reade Streets, N. Y.

ROHDE ISLAND HORSE SHOE CO.,

OFFICE, 81 Canal Street, Providence, R. I.

WORKS at Valley Falls, R. I.

Manufacturers of

PERKINS and RHODE ISLAND PATTERNS of

**HORSE AND MULE SHOES.**



WATERS' IMPROVED  
Pruning Implements



Are made of best steel on scientific principles. Light, practical, durable, cheap. Has no competitor for public favor, as thousands can testify. Manufactured in Agricultural Hall, Columbus, Philadelphia, Columbia T. No. 25. Orders for fall trade should be made early. Manufactured only in this city. Send for circular and price list.

E. S. Lee & Co.,  
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**A. A. IRVINE,**  
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PATENTED HARDWARE MANUFACTURERS.

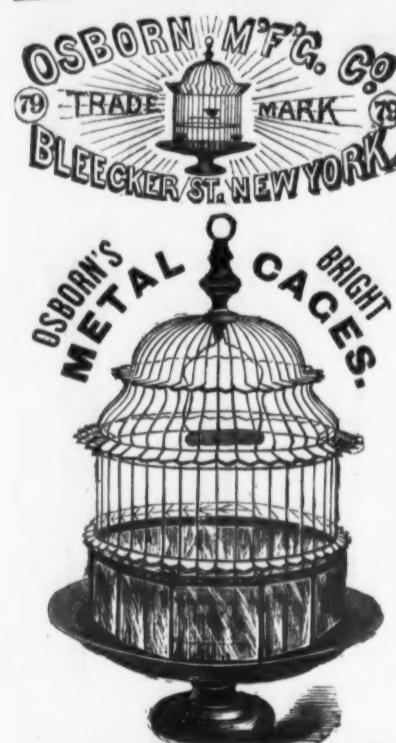


MRS. POTTS' COLD HANDLE IRONS,  
COFFEE, SPICE AND DRUG MILLS,  
CORK PRESSERS, SAUSAGE STUFFERS,  
FRUIT, LARD & JELLY PRESSES Combined,  
MEASURING FAUCETS, TOBACCO CUTTERS,  
SELF-WEIGHING CHEESE KNIVES,  
BUNG-HOLE BORERS, &c., &c., &c.

**S. W. cor. American and Dauphin Sts.**  
PHILADELPHIA.

**WEST CHESTER**  
**PRUNING SHEARS.**  
PRICE, \$1.75.  
For best discount to the trade, address  
WM. PORTER PECK, 518 Walnut Street, PHILADELPHIA, PA.

PRICE, \$1.75.



The Original Inventors and Manufacturers of the  
**OSBORN BRIGHT METAL CAGES.**  
Also OSBORN & DRAYTON improvements under  
twelve different patents. We are continually bringing  
out new and beautiful designs to meet the demands of  
refinement and taste.

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**JOHN MAXHEIMER,**  
Manufacturer of  
Jappanned & Patent Eureka Bright Metal  
**BIRD CAGES,**

247 and 249  
Pearl Street,  
NEW YORK.



Patented June 8, 1862;  
April 6, 1869; Dec. 28, 1873;  
Jan. 30, 1874; Dec. 22, 1874;  
April 30, 1875.

Crane's "76" Potato Masher.

Efficient, durable, and easily cleaned. Supplied to  
the trade only. Samples sent free to responsible  
household agents wanted in every State. Send for illustrated  
catalogs and price list.

ROBERT CRANE, Jr., Columbia, Lancaster Co., Pa.

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Water, Air, and  
Vacuum Pumps and  
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Send for Illustrated Circulars.  
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The following superior and well known Lehigh Coals are mined by ourselves and firms connected with us, viz.

**A. Pardee & Co.** (HAZLETON,  
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**Lehigh, Wyoming White & Red Ash,**  
(BALTIMORE VEN.)

Office, cor. Cortlandt & Church Sts.

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GEORGE W. NELSON, General Agent, by Hall  
ross and Morris, Canal direct from the mines, and from  
Port Amboy and Jersey City, for all Points.

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Retail Yard on D. L. & W. Railroad, cor. Grove and

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Cars and Wagons. Families and manufacturers supplied

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OFFICES: At Yard cor. Grove and 19th Sts.; cor. Bay

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and Hudson Sts., Hoboken. P. O. Box 24, Hoboken.

## AMERICAN SCREW CO., Providence, R. I.

Manufacturers of

### IMPROVED Gimlet Pointed Wood Screws, Patented

May 30,

1876.



After forty years' experience we offer to the trade our Centennial Screw, patented May 30, 1876, as the best we have ever known.

The method of manufacturing is also patented, and we are changing our machinery as fast as possible, to manufacture the improved article only. To introduce them, they will be sold at same price as the old style screw.

The new screws will be packed in manila colored boxes with new label covering end of box, and enlarged figures showing plainly contents.

To distinguish this screw we have adopted a trade mark, which is also secured to us.

1776.

Patented August 30.



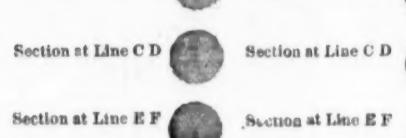
1876.

Patented May 30.

COVERED BY TRADE MARK.



Estimated to be FIFTY PER CENT. stronger than a screw as commonly made.



The above drawings show the progress of screw making from the old blunt point to style now adopted.

Experience has shown that the weak point of screws, as formerly made, is at the heel of the thread, where all the strains of forcing the screw into the wood naturally concentrate.

To avoid the sharp angle existing in the old style of screws has been the aim of all manufacturers, but every expedient hitherto adopted has proved as objectionable as the evil complained of.

It will be seen in our new screw that not only is the sharp angle avoided, but the strength very much increased, as illustrated above. See sections at lines.

#### CLAIM.

"A Pointed Wood Screw having the outer periphery of the thread upon its body cylindrical, while a portion of the body below the thread and near the neck is conical, the remainder of the body to the point being cylindrical, and yet having all the thread brought to an edge of a constant angle, without jogs in the paths between the threads, substantially as described."

## National Horse Nail Co.

MANUFACTURERS OF

**FINISHED**

[BRIGHT OR BLUED]



These nails are made of the best brands of NORWAY IRON, and are guaranteed to be equal to any in the market.

**NATIONAL HORSE NAIL CO.,**  
VERGENNES, VT.

**C. RIESSNER & CO.,**  
MANUFACTURERS,

No. 242 Pearl Street, NEW YORK.

"SUMMER QUEEN"

**Oil Cook Stove.**

FOUR SIZES.

Suitable for all purposes, for Cooking, Baking and Ironing.

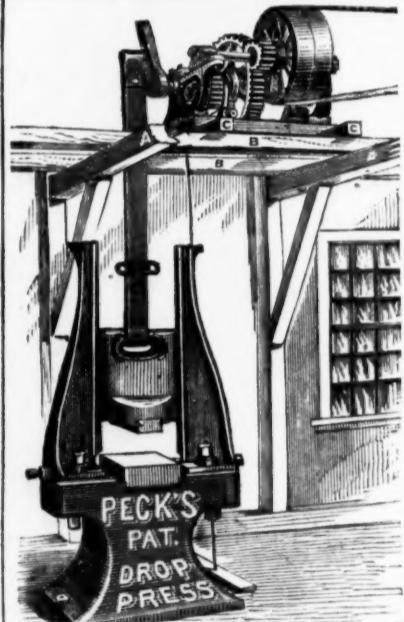
NON-EXPLOSIVE.



We would respectfully call the attention of the Trade and Public to our Heating Drum, which, in connection with our Summer Queen Oil Stove or Centennial Gas Stove, is well adapted to heat small chambers, green houses, etc.

No Smell. No Smoke. No Ashes.

**C. RIESSNER & CO.,**  
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I have the largest and best stock of Drop Press Patterns in the country—suitable for Forging, and all kinds of Sheet Metal work.

**WHY THE BEST:**

It requires less power, works faster, gives a harder blow with same weight of hammer, the rebound of the hammer is caught without lessening the force of the blow, the blow is uniform and not affected by variations in the speed of the driver. It is always in order. The Drop Press a specialty.

**MILO PECK, New Haven, Conn.**

**FISHER'S PATENT**  
Mowing Machine Knife  
GRINDER.

PRICE,

\$3.00.

or send for Circular.

ADDRESS

HENRY FISHER,

Canton,

Ohio.

**W. R. REGER,**

PATTERN AND MODEL MAKER,

Rear of 241 Arch St., Philadelphia.

(Continued from page 9.)  
INDUSTRIAL ITEMS.

## PITTSBURGH AND VICINITY.

A very pleasant occasion was enjoyed at the office of the Lucy Furnace, New Year's Day. The employees of the establishment presented the superintendent, Mr. H. M. Curry, with a beautiful gold watch and chain as a token of their regard. Mr. Curry accepted the gift in a few appropriate remarks, thanking the donors for their generous liberality.

## WEST VIRGINIA.

The lamp black works at Cumberland, owned by John Haworth, were entirely destroyed by fire Sunday night, 24th ult. The loss will not fall short of \$20,000, and is partially covered by insurance.

## VIRGINIA.

The Elizabeth Furnace property has been purchased by some Western Pennsylvania capitalists, and arrangements are being made to mine ore largely. Mr. Thos. S. Blair, of Pittsburgh, is in charge of the work.

## GEORGIA.

The Diamond Furnace, Cartersville, is still running on ferro-manganese.

The Rogers Furnace, Rogers Depot, Bartow county, is about to blow in. It is a cold-blast charcoal furnace, 36x9, with an annual capacity of 2500 tons.

## OHIO.

The Kenton Iron Fence Company of Kenton are about removing their works to Pittsburgh, where they will largely increase their facilities for manufacturing their several new styles of ornamental iron fence. These new patterns have been exhibited at the Centennial and other expositions and received highest premiums. The officers of the company are: Mr. Henry Price, of Kenton, president; Mr. E. Crawford, of Pittsburgh, treasurer; and Mr. James Young, of Kenton, secretary. The works will be situated in Allegheny City, and their offices and show-rooms in Pittsburgh.

The mill at Ashtabula and that of the Niles Iron Co., at Niles, is run on the co-operative plan, the men receiving half pay, and if at the end of a definite period the mill has made any money they get a dividend.

The La Belle Glass Works, Bridgeport, shut down on Saturday, the 23d ult., for two weeks. A roll in Brown, Bonnell & Co.'s plate mill, Youngstown, was broken Friday night, the 22d ult., and another was broken Saturday, the 23d ult. These accidents occurring at a time when the company is pressed with orders, make it necessary for the other rolls to be kept running extra time.

The Astor Mill, Bridgeport, will start up after the holidays with renewed vigor.

The Elm Furnace, Ironon, is running on Sheridan coke and native ore, and is doing well.

## OHIO.

The Lawrence Mill, Ironton, is idle still, and will probably not start until the middle of the month.

Both the Belfont and Ironton mills, Ironton, are in full operation.

Howard Furnace is using coke made from her own coal, and doing very well.

The Zanesville Furnace will be blown in sometime in the spring.

The XX Furnace in the new Straitsville region will be blown in during the present month.

The Columbus Furnace will be taken down the present year and moved to Perry county.

## MICHIGAN.

The two smoke stacks of the Rolling Mill Furnace, which were blown down a short time ago, have been replaced, and the furnace has again assumed its natural appearance, smoking as before, and making the usual amount of iron. The Fayette Furnace was badly damaged by fire on Friday night, the 15th. As nearly as we can ascertain, one of the arches gave out, and the iron breaking out over the dam, set the whole concern on fire. The damage is estimated at from \$30,000 to \$50,000. We are unable to say how long the accident will keep the furnace out of blast.—Marquette Mining Journal.

## WISCONSIN.

The Milwaukee Mills have been entirely idle since spring.

## The Sugar Maker's Friend.

PRICE, \$4.50 per hundred.  
Agents wanted in every Sugar District to carry on the sale of  
Post's Patent Metallic Eureka Sap Spout and Bucket Hanger, Samplers, Circulars and Termine seat postpaid on receipt of 20 cents. Address  
C. C. POST, Manuf. & Patentee, Burlington, Vt.

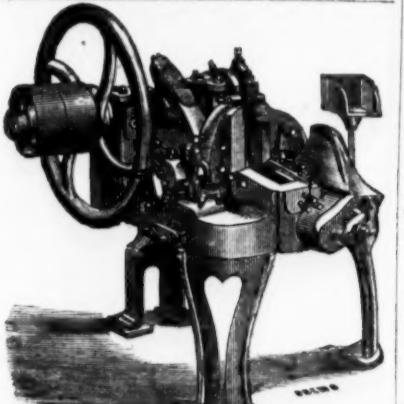
FITZHUGH'S  
Elevating and Conveying  
Machine.



For raising any weight and depositing the same in any desired place. Furnished to the wholesale hardware trade only by the patentee and sole manufacturer.

J. R. FITZHUGH,  
4228 Market St., Philadelphia.

Agents wanted in every State. Send for illustrated circular and price list.



PITTSBURGH MFG. CO.,  
Manufacturers of Nail and Spike Machines, Patent  
Bolt Heading Machines, Steel Cutters, Pipe Cutters,  
Bolts, Nuts, Washers, Rivets, &c. Castings, Forgings  
and Blacksmith Work promptly attended to  
Office & Works, Railroad St., near 28th, Pittsburgh, Pa.

**The Cowles Hardware Co.,**  
UNIONVILLE, CT., Manufacturers of  
**HARDWARE & HOUSE-FURNISHING GOODS.**

GEO. DUNHAM, Pres. G. S. KNAPP, Treas. MARTIN COWLES, Sec.

Screw Drivers of all varieties, Box Scrapers, Box Openers, Garden Hoes, Garden Trowels, Border Knives, Mincing Knives, Fish Turners, Butter Knives, Cake Turners, Cleavers, Hammers, Carpet Stretchers, Tack Claws, Marking Awls, Carpenters' Awls, Belt Awls, Ice Awls, Carriage Jacks, Nail Sets, Bush Hooks, Ice Axes, Ice Tongs, Patent Mouse Traps, Vegetable Slicers, Bit Braces, Butts and Spiral Springs, Ferrules, Ham Tryer, Ham Stringers, Oyster Knives, Cold Chisels, Handles, Solid and Prick Pinches, Box Hooks, Bow Pins, Hinges, Cabinet, B. T. Rings, Bill Hooks, Blind Authors, Curving Boxes, Bright Cork Screws, Cattle Leaders, Corn Hooks, Dov. Spoons, Knives (Kitchen), Saw Sets (Hart's Patent), Saw Sets (Aiken's Patent), Saw Sets (Improved Bench), Spikes, Table and Chair Whistlers (Tin and Iron), Knob Rings specialty, and IMPLEMENTS & CREW DRIVERS. Catalogues and Circulars sent on application.

WM. A. DODGE, Agent,  
98 Chambers St., N. Y.

**WORCESTER MACHINE SCREW CO.,**  
WORCESTER, MASS. Established 1867.

MANUFACTURERS OF

**Standard Machine Screws.**

ALSO

**Square, Round, and Hexagon Head Set & Cap  
Screws, in Iron, Steel and Brass.**

We have adopted the American Screw Co.'s price list for Machine Screws. Attention is called to our reduced price list for Set and Cap Screws, adopted January 1, 1877. A full line of all goods kept in stock at both the factory and store of our agents.

H. S. MANNING & CO., No. 111 Liberty St., N. Y.

Send for Lists and Discounts.

**Edge's Pat. Finger Nail Trimmer and Knife Combined.**



**IMPORTANT NOTICE TO THE TRADE.**

We are now placing the above newly patented instrument upon the market. It sells at sight, is neat, compact and strong. Requires no sharpening. Is used as easily with the left hand as with the right. It will find ready sale at

**LARGE PROFITS TO BOTH JOBBER AND DEALER,** and will be extensively advertised throughout the country. For price lists and other information address

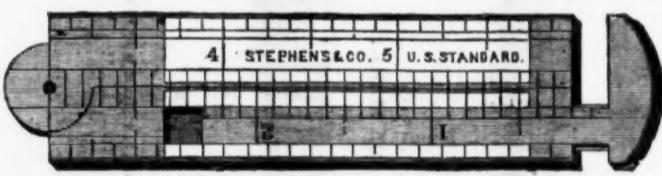
W. C. EDGE, No. 5 Maiden Lane, New York.

FACTORY, 46 Green Street, Newark, N. J.

Established in 1854.

**STEPHENS & CO.,**

**Manufacturers of U. S. STANDARD BOXWOOD and IVORY RULES.**



Also Exclusive Manufacturers of L. C. Stephen's Patent Combination Rule. Rules graduated in foreign measure to order. RIVERTON, CONN.

4 STEPHENS & CO. 5 U. S. STANDARD.

**C. A. & W. L. TEAL,**  
MANUFACTURERS OF  
Improved Boiler Plate Bending Rolls,  
Boiler Plate Planing Machines,  
COMBINED  
Punching & Shearing Machines  
AND  
Single Power Punching Machines,  
With Shearing Attachments for Rolling mills,  
Boiler Makers, &c.  
Attachments furnished for punching Nuts  
and Washers complete at one stroke.  
Rotary Shearing Machines, Steam  
Engines, with Teal's Balance  
Sides-Valves,  
Improved Hair Picking & Cleaning  
Machines, and  
Machinery in General.  
4116 Ludlow St., Philadelphia

**J. A. YINCLING,**  
Manufacturer of  
Hand, Power & Steam  
PUMPS.

Proprietors of the celebrated

Patent Washer Well Point  
and Earth Auger.  
Drive Well Material a Specialty.

15 Public Landing, Cincinnati, O.

Send for Price List.

**JOHN I. BROWER & SON,**  
288 Greenwich St., N. Y.  
General Assortment of

**HARDWARE**

For the Country Trade.

**Romer's Padlocks,**

WINSTED TOE CALKS,

D. E. FELTER & CO.'S ICE TOOLS,

Enterprise Mfg. Co.'s Goods,

A full line constantly on hand.

**AUSABLE HORSE NAILS**  
POLISHED OR BLUED.  
HAMMERED AND FINISHED



**The Ausable Nails**

Are Hammered Hot,  
And the Finishing and Pointing are  
Done Cold,

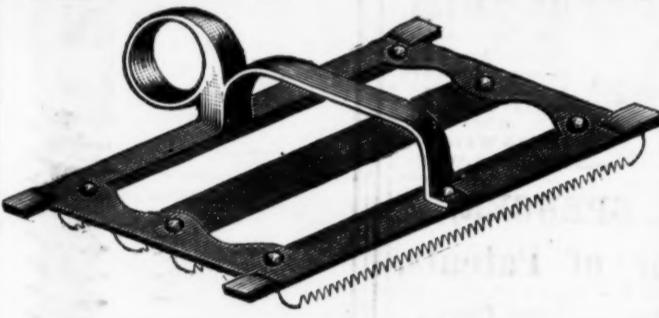
Thus Imitating the Process of Making Nails by Hand.

Quality is Fully Guaranteed.

For Sale by all Leading Iron and Hardware Houses.

ABRAHAM BUSSING, Secretary,  
35 Chambers St., New York.

**HOTCHKISS' PATENT NOVELTY COMBS.**



THIS CUT ILLUSTRATES THE GRASPING OF THE COMB.



Manufactured by  
HOTCHKISS' SONS,  
Bridgeport, Conn.

These Combs do not infringe upon the rights of any one. They are the Simplest, Neatest and Most Durable CURRY COMBS ever offered to the trade, affording an easy grasp for the hand, without the use of the ordinary side handles, and are universally acknowledged to be superior to all others. They are neatly packed in paper boxes of one dozen each, and packed 24 dozen in a case. Special net prices furnished on application.

**MEIKLE**



**CELEBRATED  
IRON BEAM DOUBLE SHOVEL PLOW.**

THOS. MEIKLE & CO., Louisville, Ky.

Send for Circular.

## Cutlery.

## FRIEDMANN &amp; LAUTERJUNG,

Manufacturers of PEN AND POCKET CUTLERY.

Solid Steel Scissors, Shears, Razors,  
Russia Leather Straps, Hones, &c.

Sole proprietors of the renowned full concave patent

"ELECTRIC RAZORS,"

And the celebrated "ELECTRIC SHEARS." Nickel Plated Bows.

Agents for the BENGALL RAZORS.

AMERICAN TABLE CUTLERY, BUTCHER KNIVES, &amp;c.

91 Chambers and 73 Reade Sts., N. Y. 423 N. Fish St., ST. LOUIS, MO.

MERIDEN CUTLERY CO. Received the HIGHEST CENTENNIAL PRIZE.



MANUFACTURE ALL KINDS OF TABLE CUTLERY.

Exclusive Makers of the "PATENT IVORY" or Celluloid Knife, the most durable WHITE HANDLE known. The Olden Manufacturers in America. Original Makers of the HARD RUBBER HANDLE. Always call for "Trade Mark" MERIDEN CUTLERY CO. on the blade. Manufactured by all Dealers in Cutlery, and by the MERIDEN CUTLERY CO., 49 Chambers Street, New York.

THE LAMSON & GOODNOW  
88 CHAMBERS ST. MFG. CO.  
N.Y.  
AMERICAN TABLE CUTLERY &c.  
GARDNER'S PATENT

THE MILLER BROTHERS CUTLERY CO.,  
Manufacturers of  
PATENT FINE PEN & POCKET CUTLERY  
WEST MERIDEN, CONN.

The only Knives made that are put together in such a manner that there is no strain on the covering or frail part of the knife. We warrant our knives equal in cutting qualities and workmanship to any made, and are acknowledged by English makers as the Best American Knife. We also make  
NICKEL & SILVER PLATED POCKET KNIVES

which will not rust or become discolored when used as a Fruit Knife, and in New York by Messrs. J. Clark Wilson & Co., No. 81 Beckman Street (who have a full stock of all patterns always on hand), and also by Messrs. G. B. Walbridge & Co., No. 99 Chambers Street.

NAUGATUCK CUTLERY CO.,  
Manufacturers of FINE PEN & POCKET CUTLERY.  
FULLER BROS., Sole Agents. 89 Chambers and 71 Reade Sts., N. Y.

HALL, ELTON & CO.,  
Electro Plated Ware, German Silver and Britannia Spoons.



THE "PALACE."

Factories, Wallingford, Conn.

JOSEPH S. FISHER,  
No. 411 Commerce St., PHILADELPHIA  
AGENT FORGeorge Wostenholm & Son,  
"Limited."  
Washington Works, SHEFFIELD,  
Celebrated I-XL Cutlery, Razors, &c.AGENT FOR  
WALTER SPENCER & CO.,  
Steel and File Manufacturers,  
Rotherham, ENGLAND.Corporate Mark  
No. SPENCER  
ROTHAM

Granted 1777.

VAN WART, SON &amp; CO.

Hardware Commission Merchants,  
EXPORTERS AND IMPORTERS,  
BIRMINGHAM, - ENGLAND,  
Agents.McCoy & COMPANY,  
134 & 136 Duane Street, N. Y.George H. Gray & Danforth,  
48 India Street, Boston.

F. W. TILTON.

17 Old Lower Street, New Orleans.  
At each of these places a complete assortment of sam-  
ples of Hardware and Fancy Goods will be found, in-  
cluding all new descriptions. Sole Agents for  
John Rimmer & Son's Celebrated  
Harness and other Needles.W. Clark's Genuine Horse Clippers.  
Seydel's "Ashante" Pocket Hammock.McCoy & COMPANY,  
BORAX A SPECIALTY,  
134 & 136 Duane St., New York.F. W. HARROLD,  
Birmingham and Sheffield,  
ENGLAND.Importer on Commission  
OR  
HARDWARE, CUTLERY, GUNS, &c.W. SANDERS, Agent,  
76 Reade Street, N. Y.CORPORATE MARK,  
\* \* \*Joseph Rodgers & Sons'  
(LIMITED)CELEBRATED CUTLERY,  
No. 82 Chambers Street, New York.  
F. & W. CLATWORTHY, Agents.The demand for Joseph Rodgers & Sons' produc-  
tions having considerably increased, they have,  
in order to meet it, greatly extended their  
Manufacturing Premises and Steam power.To distinguish Articles of Joseph Rodgers  
& Sons' Manufacture, please see that they bear  
their Corporate Mark.OWEN & CAMPBELL,  
Manufacturers of  
PEN AND POCKET  
CUTLERY.All blades forged from the best English Cast Steel,  
and Manganese. Each knife is made in the  
most substantial and compact manner, all articles  
used being of the best quality. All blades stamped  
Owen & Campbell, Philadelphia.  
Orders filled from the Factory Rear of  
220 N. Second St., PHILADELPHIA.

## Cutlery.

ESTABLISHED 1852.

## NEW YORK KNIFE CO.

MANUFACTURERS OF SUPERIOR

## Table &amp; Pocket Cutlery,

WARRANTED TO BE MADE OF THE BEST  
MATERIAL.

## WALKILL RIVER WORKS,

Walden, Orange Co., New York.

THOS. J. BRADLEY, President.



## Young's Patent Folding Scissors.



Pat. May. 29. 72.

See illustration of the small size.

These Scissors are made of the very best steel, nickel-plated, and so constructed that they can be readily folded and carried in the pocket without injury to the garments. A sample pair will be sent by mail, to the address, upon receipt of the retail price, namely: \$1.00. For small size, either black or pointed. \$1.50. Large size, pointed or half pointed. \$2.00. New York, Feb. 1st, 1876.

MAY BROS., Proprietors,  
420 Broadway.CAPEWELL MFG. CO.,  
Manufacturers ofShot Belts, Pouches, Powder Flasks,  
Powder and Shot Measures,  
WOODBURY, CONN.Salesroom, 295 Broadway, N. Y., with LANDERS,  
FRANT & CLARK, Mfrs. of Table Cutlery.

Established 1853.

AMERICAN SHEAR CO.

Manufacturers of

Pen and Pocket Cutlery,  
Shears, Scissors and Pruning Shears,  
HOTCHKISSVILLE, CONN.Salesroom, 295 Broadway, New York, with  
LANDERS, FRANT & CLARK.

## Steel in Russia.

That the metallurgy of iron and steel is a branch of industry to which the Russians give a large amount of attention has long been known in this country, yet additional proof of this is given in the exhaustive little memoir communicated to the Russian Technical Society, by Mr. D. Chernoff, the assistant manager of the Abouchoff Cast Steel Works, near St. Petersburg, briefly mentioned in an extract from the London Echo, which appeared in a recent issue of *The Iron Age*. The fuller information given below is from a translation of Mr. Chernoff's paper by Mr. W. Anderson, of the Erith Iron Works:

The purer the iron and carbon combined in the steel the higher are its qualities, and Mr. Chernoff adds that the best steel ever made in any age or country is without question "boulat," the saber steel of the Tartars. The special quality of boulat, and especially the markings on its surface have proved misleading; all thought to find the extraordinary qualities of this steel in some special mixtures; careful analyses, however, showed nothing to explain the characteristic veining, which veining is closely connected with its quality. By melting steel with platinum, silver, and so on, veining was produced, but they were wanting in regularity and beauty, and the steel was always inferior to boulat. Another peculiarity is that if a good specimen of boulat with clearly marked veining be heated to bright red, and then allowed to cool, it will be impossible to restore the melting, no matter how long you treat the surfaces with acid; but the veining produced by the mixture of metals never disappears however much the steel may be heated. But if the piece of boulat be melted again, then, if certain conditions in the cooling of the ingot be observed, the veining appears again, though of a somewhat different design; in this manner it is possible to produce or annihilate the pattern several times.

The number of valuable conclusions put forward in the pamphlet is very large. It has been found that if steel melted in a crucible is constantly kept in violent agitation while cooling, agitation violent enough to keep all its particles in motion, then the cold ingot produced will have a very finely crystallized structure; if, on the other hand, the melted steel is allowed to cool in perfect quiet then the resulting casting will consist of large well developed crystals. The appearance of these crystals, and generally the tendency to crystallize under these circumstances, will depend on the purity of the steel. It is contended that the ultimate purity of the steel depends upon that of the iron and carbon forming it, and that the best steel is composed of only these two elements. The opinion of Fremy that nitrogen is essential to the existence of steel is denied to be not supported by the most careful researches—for, on the one hand, nitrogen is found also in soft wrought iron and in cast iron, and, on the other, the quantity of iron found in steel is very variable, and bears no fixed relation to the quantity of carbon; and, furthermore, it exists in such small quantities as to be less than a tenth part of the carbon. With reference to the influence of different metals on the quality of steel it is explained that some of them communicate a particular color, some diminish the tendency to rust, and others, displacing the carbon, enable the steel to acquire very great hardness in tempering and so on; but the greater number of substances combined with steel even in the most insignificant proportions very considerably lower its quality. Speaking generally, all the efforts of metallurgists to obtain the highest qualities of steel should be directed to separating impurities from the raw materials, so that the produce of their operations should be a combination of iron and carbon; and all the species and nostrums forming the subject of so-called secrets will be found to consist in effect not in the introduction of new materials, but in purifying the raw, and only, as a last expedient, driving out pernicious impurities by means of substances less harmful.

Steel, then, cast and allowed to cool quietly assumes a crystalline structure. If such an ingot be heated bright red and allowed to cool without working it in any way then, on breaking the mass, it is found that its structure has been altered. To explain the law of change of structure by heating, a scale is made with marks corresponding to several determined temperatures. In this scale,  $a$  is  $\frac{1}{2}$  red;  $b$ , red, but not zero;  $c$ , mark;  $d$ , cherry red;  $e$ , red, but not zero; and  $f$ , the melting point of a given sample of steel. The points  $a$ ,  $b$  and  $c$  have no permanent place on the scale, but vary with the quality of the steel. Thus:

Rising from  $b$  to  $c$ ,  
No change of structure.  
From  $c$  to  $d$ ,  
A rising porous structure.

$a$  to  $b$ ,  
Will not harden.  
 $c$  to  $d$ ,  
Falling from  $c$  to  $d$ ,  
Crystallization.

In pure steel this variation depends directly on the quantity of carbon contained; and the harder the steel the nearer these points move to  $a$ , and the softer the steel the farther off, and, speaking generally, with varying rates. The limits of these movements are so narrow that an inexperienced eye will hardly discern them. He has been compelled to denote the temperatures by the colors exhibited in heating, the various shades of which only an experienced eye can appreciate, and it must be added that the colors named have reference only to hard and medium quality steel; for in the very soft kinds, nearly approaching to wrought iron, the points  $a$  and  $b$  recede very far, so that, for example, in wrought iron the point  $b$  corresponds to white heat. Defining the point  $a$ , it is stated that steel, however hard it may be, will not harden if heated to a temperature lower than  $a$ , however quickly it is cooled; on the contrary, it will get sensibly softer and more easily worked with a file. The definition of the point  $b$  is that steel heated to a lower temperature than  $b$  does

not change its structure whether cooled quickly or slowly; this expression, however, must be taken conditionally, because steel during long periods of time, and especially under the influence of shocks or vibrations and at ordinary temperatures, but to  $b$  than wrought iron, changes from the finely granular to the coarse crystalline structure; and as regards the heated and, therefore, softened condition, and especially at temperatures approximating to that indicated by the point  $b$ , it is probable that with the greater facility of motion the change of structure will take place more rapidly. He has himself kept steel at a temperature near  $b$  for eight hours without being able to detect any change of structure. When the temperature goes above  $b$  the steel quickly passes from the granular or crystalline to the amorphous or waxy-like structure, which it retains up to its melting point, which the point  $c$  represents. In this condition steel is incompressible, and with respect to permanence of amorphism has an analogy to an exceedingly concentrated solution of a strongly crystalline salt. If such a solution be allowed to cool very slowly and in perfect quiet then large regular shaped well developed crystals will be formed, but if with the same gradual cooling the liquid be kept constantly shaken up the crystals will come out very small. Allowed to cool quietly the crystals will also be small; and, finally, the least favorable condition for crystallization is when the liquid cools rapidly, and is, at the same time, violently agitated. It is found that the same changes take place in the structure of steel heated above the point  $b$ . The higher steel is heated the softer it becomes; the greater, therefore, is the liberty its particles possess to group themselves into crystals if the quiet of the mass be not disturbed by extraneous forces, and the slower the temperature is suffered to fall to the point  $b$  the more time they have for the purpose. In fact, liquid really obeys the usual chemical laws of crystallization, so that it is really in the control of the manipulator to produce any kind of steel from the hardest crystalline to that of the finest silky texture.

Mr. Anderson has rendered much service to steel manufacturers in translating the paper, and his labors will, doubtless, be largely appreciated.

## Railway Freight Rates.

Another advance in Eastward-bound freight rates, equal to 5 cents upon each 100 pounds from Chicago to New York, has been agreed upon, to take effect next Monday. This will make rates on fourth-class freights and on grain and flour, from the points named to New York, as follows:

	Grain and Flour.
Chicago...	.45
Cincinnati...	.39
Cleveland...	.33
Detroit...	.40
Evansville...	.48
St. Louis...	.40
Hannibal, Mo...	.53
Indianapolis...	.43
Louisville...	.47
Quincy, Ill...	.54
Sandusky...	.35
St. Louis...	.50

No change has been made in rates on Westward-bound freight, and information obtained from trustworthy sources confirms the report that very little freight has been shipped West at the rates established Dec. 18, 1876. Many of the contracts at the low rates existing before the recent agreement was signed have not yet expired, and regular shippers, it is positively stated, have no difficulty in renewing the contracts that expired with the first of the year at the old rates. An occasional shipper forwarding a small quantity of goods, or a new firm that is not well informed as to the condition of affairs, may pay, it is stated, the new schedule rates, but these constitute the exception instead of the rule. The claim of the merchants is to the effect that it would be very unjust to discriminate among the regular customers of the different trunk lines against certain shippers whose contracts happen to have expired before those of their competitors, and they unhesitatingly demand, at the price of their patronage, that they shall have rates as low as anyone. A large portion of the shipments from the West, it is also stated, are made *on credit*, and the contracts which have not been renewed at the time of expiring as those to the West is because the railroads are not supplied with equipment sufficient to carry the grain and other produce that is offered in the West, and consequently they are somewhat better able to maintain the advance in rates. When the present blockade is removed, it is asserted, it will be no easier to maintain the advance in rates in Chicago than it now is here.

Although it was confidently asserted a week ago that a meeting of the foreign freight agents of the different trunk lines would be held at once, and that rates on through bills of lading between the principal points in the West and Europe would be established, no such meeting has yet taken place, and the agents of some of the lines, it is stated, have not yet received their instructions in regard to the matter. No rates have been established on through bills of lading, and no notice of an application for a rebate on goods shipped to this port and subsequently reshipped to a foreign port has been given to the several parties to the recent contract.

If the United States does not develop a great trade with the Empire of Brazil it will not be for lack of encouragement by Brazil. Another step is being taken in the direction of closer relations with this country under the auspices of Brazilians. It is now proposed to establish in the city of New York an agency to be called The Imperial Brazilian Bureau. Its object is to bring the Empire of Dom Pedro and its resources before the people of this country, and "to invite, stimulate, and encourage American merchants, planters, and manufacturers to establish in the Empire commercial, agricultural, and industrial enterprises."



THE "SUNBEAM" ILLUMINATING  
GAS STOVE.  
Prepare for Chilly Mornings and Evenings.  
For Warming Chambers, Halls, Corridors, Bath Rooms,  
Offices, Conservatories, Patented Feb. 22, 1876.

Reflected Light and Heat. Radiated Heat and Heated Air. Combination of gas perfect.  
A. & W. MOON TON, Patentees, 22 Platt St., N. Y.  
Send for Price List. Territory for sale.



# Trade Report.

Office of THE IRON AGE.

WEDNESDAY EVENING, JAN. 17, 1877.

The financial markets have been undisturbed by any extraordinary influences during the past week, and transactions have been on a restricted scale. The money market has been easier, with a decline to 5 @ 6 per cent. for call loans, closing easy at the inside figure. The discount rate has also been somewhat easier, prime mercantile paper being negotiable at 5 @ 6 per cent., without any free offerings of good names.

Gold has recovered somewhat from its steadily downward course, and an advance has been established, as high as 107 being reached on Tuesday. There was another decline from that point, however, and the ruling rate on Wednesday was 106 @ 106%, closing at 106%. The following table shows the daily range of the premium:

	Highest.	Lowest.
Thursday.	106	105%
Friday.	105%	106
Saturday.	106%	106%
Monday.	106%	106%
Tuesday.	107	106%
Wednesday.	106%	106%

There has been a more active call for governments, with heavy investment purchases. One California institution took \$2,000,000 in a single amount. The market has been strong in consequence, and higher quotations have been established. State bonds have been quiet but remain steady, while railroad bonds are strong under moderate transactions. In the stock market the chief features have been decline in railroad and coal stocks and an advance in telegraphs.

The principal dealings have been in Western Union, Lake Shore, Michigan Central, Delaware, Lackawanna and Western, and St. Paul. The Pennsylvania and Baltimore and Ohio roads advanced their Eastward bound freight rates 5 cents per 100 on Monday, but the Erie, Central and Lake Shore held out at the old rate, though on Wednesday it was announced that the Erie managers would make the advanced rate on freight received from the Western roads which had adopted the new tariff. This leaves the Central and Lake Shore again alone in the contest with the Southern lines. We give below the closing quotations of active shares.

The following is a comparison of the bank averages for the past two weeks:

Jan. 6.	Jan. 13.	Differences.
Loans.....	\$54,800,100	254,173,400
Specie.....	38,370,800	39,737,900
Legal tend. ....	35,283,300	37,042,900
Deposits.....	290,783,600	223,568,300
Circulation.....	3,084,700	3,084,700
.....	15,503,400	15,157,300
.....	15,900	15,900
Total for week.....	\$7,804,673	\$8,889,000
Prev. reported.....	5,908,864	7,528,589
Since Jan. 1.....	\$8,008,536	\$16,417,539
.....	12,345,081	12,345,081

The foreign trade movements for the week are shown as follows:

IMPORTS.		
For the week ended Jan. 13:		
1875.	1876.	1877.
Total for week.....	\$7,804,673	\$8,889,000
Prev. reported.....	5,908,864	7,528,589
Since Jan. 1.....	\$8,008,536	\$16,417,539
.....	12,345,081	12,345,081

The following are the closing quotations of Cutlery, and will at all times endeavor to keep a complete line of leading and most desirable patterns of our own Pocket Cutlery, consisting of Fraser, Continental and Field brands. Also, Wostenholm's Pocket Cutlery and Razors, and Wade & Butcher's Razors, which we are prepared to offer to Jobbers and wholesale dealers at lowest market rates.

We have entirely revised our stock list of Cutlery, and will at all times endeavor to keep a complete line of leading and most desirable patterns of our own Pocket Cutlery, consisting of Fraser, Continental and Field brands. Also, Wostenholm's Pocket Cutlery and Razors, and Wade & Butcher's Razors, which we are prepared to offer to Jobbers and wholesale dealers at lowest market rates.

The Meriden Cutlery Company inform us that they have withdrawn their quotation of discounts on Table Cutlery, and their printed list is now void, except as a descriptive one. Their prices are net, to correspond with the other manufacturers in the combination.

In consequence of the unsettled condition of the Screw market, and the special discounts quoted by some manufacturers and their agents, the Russell & Erwin Mfg. Co. have issued the following letter circular:

## GENERAL HARDWARE.

The uncomfortable condition of our streets, and the varieties of weather that we have enjoyed during the week, added to presidential uncertainty, and the natural dullness incident to the first month of the year, tend to produce about as dull a condition of affairs as the business community of New York have ever experienced. The local trade has been unusually light during the week. The changes in lists and discounts which have occurred since our last writing are given below. In the matter of Strap and T Hinges no satisfactory arrangement has been concluded by the makers, and these goods are offered at prices which it is believed are under the cost of production. For sometime past we have quoted Strap and T Hinges at discount 70 per cent., but as any printed price would be but nominal in the present condition of the market we omit the quotation altogether.

The demand for Nails is very light, but makers look for a speedy improvement in this branch of trade as soon as better weather renders transportation a less serious matter than it is at present. At the meeting of the Nail Manufacturers' Association of the Atlantic States, mentioned by us last week, no change in price or terms was made. We quote, as before, 10d. to 60d., \$8 per keg, net, with the usual allowance of 10 cents per keg for orders of 100 kegs and over, taken in 30 days.

In Foreign Hardware little has transpired. A'fred Field & Co., No. 98 Chambers street, issued, under date of 12th instant, a descriptive list of a number of patterns of Wostenholm's Pocket Knives and Razors, and Wade & Butcher's Razors, which they have decided to discontinue from their assortments of these brands. They offer them at prices very much under market rates. The quantities of each pattern are given in the circular, which also contains the following notice:

We have entirely revised our stock list of Cutlery, and will at all times endeavor to keep a complete line of leading and most desirable patterns of our own Pocket Cutlery, consisting of Fraser, Continental and Field brands. Also, Wostenholm's Pocket Cutlery and Razors, and Wade & Butcher's Razors, which we are prepared to offer to Jobbers and wholesale dealers at lowest market rates.

The Meriden Cutlery Company inform us that they have withdrawn their quotation of discounts on Table Cutlery, and their printed list is now void, except as a descriptive one. Their prices are net, to correspond with the other manufacturers in the combination.

In consequence of the unsettled condition of the Screw market, and the special discounts quoted by some manufacturers and their agents, the Russell & Erwin Mfg. Co. have issued the following letter circular:

## OFFICE OF RUSSELL & ERWIN MFG. CO., 45 and 47 Chambers street, NEW YORK, 1877.

DEAR SIR: Replying to yours asking quotations on Screws, we take pleasure in saying that for the present our regular terms on Flat Head Bright Iron Wood Screws are 60 per cent. discount from list, cash 30 days, no prices guaranteed. We will give your house an additional discount of — per cent., and deduct the same from invoice.

Orders for large quantities of any regular size will be specially considered. Discounts subject to change without notice.

We shall be glad to receive your orders, which shall have our best attention. We invite the closest inspection of our Screws and the severest tests of quality in comparison with any other Screws manufactured.

## OFFICE OF RUSSELL & ERWIN MFG. CO., 45 and 47 Chambers street, NEW YORK, 1877.

DEAR SIR: Replying to yours asking quotations on Screws, we take pleasure in saying that for the present our regular terms on Flat Head Bright Iron Wood Screws are 60 per cent. discount from list, cash 30 days, no prices guaranteed. We will give your house an additional discount of — per cent., and deduct the same from invoice.

Orders for large quantities of any regular size will be specially considered. Discounts subject to change without notice.

We shall be glad to receive your orders, which shall have our best attention. We invite the closest inspection of our Screws and the severest tests of quality in comparison with any other Screws manufactured.

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Patent Threaded Table Spoons.									
Solid Strong.					Riveted.				
No. 916 or 40 217 or 41 240 or 42					924 or 60 226 or 62				
Inches 7 3/4					8 1/4				
8 1/4					7 3/4				
Tin'd 1/2					6 1/2				
\$7.00					7.25				
7.25					7.50				
6.00					6.50				
250 or 20 251 or 21 22					250 or 20 251 or 21 22				
Inches 7 3/4					8 1/4				
Tin'd, per gross					\$8.00				
\$8.00					8.50				
"Case lots" 6 gross of any one number.									

Patent Threaded Table Forks.

No. 24, Solid, Tinned, 7 3/4 inches, per gross \$9.00

"Case lots" 6 gross.

Patent Threaded Basting Spoons.

Solid

1 inch 10 12 14 16 18 20

Tin'd, per doz. \$1.35 1.55 1.75 2.00 2.25 2.45

Blvted Flat or Round Handle or Threaded.

1 inch 10 12 14 16 18 20

Tin'd, per doz. \$1.10 1.20 1.40 1.60 1.90 2.10

"Case lots" 24 dozen.

Round Handled Table Spoons.

No. 11 or 160 11 1/2 or 170 12 or 180 9 1/2 or 85

Tin'd, per gr. \$8.50 6.75 7.00 4.00

Flat Handled Table Spoons.

No. 22 or 09 11 or 02

Tin'd, per gross \$6.00 3.75

Forged Basting Spoons.

1 inch 10 12 14 16 18 20

Tin'd, per doz. \$1.50 1.75 2.00 2.25 2.50

"Case lots" 24 dozen.

Superior Silver Steel Spoons.—Oval Thread.—Patent.

No. 2, Table, 8 1/2 inches, per gross \$19.50

"Case lots" 6 gross.

No. 3, Tea, 6 inches, per gross 7.75

"Case lots" 12 gross.

Superior Silver Steel Table Forks.—Oval Thread.—Patent.

No. 7, 7 1/2 inches, per gross \$15.00

"Case lots" 6 gross.

Superior Silver Steel Table Forks.—Olive.—Patent.

No. 5, Table, 8 1/2 inches, per gross \$19.50

"Case lots" 6 gross.

The Stanley Works, New Britain, Conn., and No. 79 Chambers street, have issued, under date of 1st instant, the following discount sheet, to apply to their price list of October, 1870, and supplements of Feb. 5, 1874, and July 1, 1875. Those goods the prices of which have been changed are indicated by an asterisk:

(Circular No. 81.)

Discount per cent.

Bronzed Capped Butts.

Bronzed Loose Joint Butts with Acorns.

Bronzed Narrow Butts, &c.

Bronzed Light Narrow Butts.

\*Bronzed Parliament Butts.

Bronzed Barrel Belts.

Bronzed Flush Bolts.

Bolts, Cottages, 10.

Bolts, Wro't Barrel, B. K., New List.

50, 10 & 10

Bolts, Wro't Barrel, T. K., New List.

50, 10 & 10

Bolts, Wro't Barrel, P. K., New List.

50, 10 & 10

Bolts, Light Wro't Barrel, Brass Knob, New List.

50, 10 & 10

Bolts, Wro't Brass Barrel.

35

Bolts, Wro't Brass Barzel, Tinned Bolts.

35

Bolts, Loose Joint Butts with Acorns.

10

Bolts, Narrow Butts, &c.

40

Bolts, Light Inside Blind Butts.

30

Bolts, Parliament Butts.

30

Bolts, Smooth Sunk and Proj.

15 & 10

Bolts, B. K., Flue-h, Common.

30 & 10

Bolts, B. K., Flue-h, Ex. Heavy.

30 & 10

Bolts, Plated K. and Sdle. Flush.

10 & 10

Bolts, Bronzed K. and Sdle. Flush.

10 & 10

Bolts, Wro't Wrought Shutter.

35

Bolts, Wro't Wrought Shutter, "Stanley's".

50

Bolts, Cased Shutter.

50

Bolts, Shutter, T. K. Lock.

15 & 10

Bolts, Shutter, Tinned Knob.

30

Bolts, Shutter, Galvanized.

40 & 5

Bolts, Southern Door.

20

Bolts, Wro't Sq're Sp'n, New List.

50, 10 & 10

Bolts, Wro't Store Door, New List.

50, 10 & 10

Bolts, Wro't Store Door, Round Neck.

35

Bolts, Wro't Square.

30

Bolts, Light Narrow, Blad. Jap'd.

20

Bolts, Smooth Bright Iron, as follows:

Bolts, Light Narrow, Loose Pin, List of Narrow.

5

Bolts, 2x2 and 2x3 1/2, L'se Pin, List of L'se J't.

30 & 5

Bolts, 2x2 and 2x3 1/2, L'se J't, List of L'se J't.

30 & 5

Bolts, L'sr Narrow, Smooth Bright Iron.

30 & 5

Bolts, B. K., Back Flaps.

35 & 5

Bolts, In-side Blind.

35 & 5

Bolts, Table.

35 & 5

Bolts, Pew Door.

40 & 5

Bolts, Reversible, List of Loose Joint.

40 & 5

Bolts, Light Inside Blind, Smooth Bright Iron.

40 & 5

Bolts, Reversible, Jap'ned.

12 & 5

Bolts, Car with Acorn.

40

\*Bolts, Acorn and Fric. Boiler.

\*Bolts, Loose Joint, with Japanned.

\*Bolts, Brass or Silvered Acorns.

\*Bolts, Jap'd, Loose J't, with Acorns.

\*Bolts, Loose Pin, with Silv'd, Acorns.

\*Bolts, Parliment.

Gorner Irons.

ever, seem to be moving, and we should not be surprised if in the course of a few weeks the principals in the matter should come together with a view of discussing the question. Until that time the trade can safely rest in peace, for at present the representatives of the great companies have not even conferred with each other upon the subject.

Prices remain unchanged at circular rates, the only difference between this week and last being that the dealers are not shading prices quite as much as last week. Our quotations will be found on page 24.

#### OLD METALS, PAPER STOCK, &c.

The Old Metal market still continues very quiet, and quotations remain about the same as last reported, with the exception of Wrought Iron, which has declined \$1 per ton. The Rag and Paper Stock market has somewhat improved since last week, especially White Rags No. 1, which is in active demand. Grass Rope is also in good request. We quote the following as the current purchasing rates:

**Old Metals.**—Copper, 16c. per lb.; Yellow Metal, 10c.; Brass, 9c.; Composition, heavy, 12c. @ 18c.; Lead, solid, 4½c.; Tin Lead, 4c.; Zinc, 4c.; Pewter, No. 1, 13c.; do., No. 2, 8c.; Speier, 5½c.; Wrought Iron, \$3.75 to \$4. f. o. b. Port Oran; Magnetic Lancaster Ore, suitable for Anthracite or Bessemer purposes, \$8 per ton, f. o. b. Baumgardner's Station, Pa. Virginia, and Lake Champlain Ores are entirely nominal, and no recent business is reported.

**Manufactured Iron.**—There is no special change to note in Bar Iron, although the orders have been somewhat more numerous than for several previous weeks. Still, the demand is very insignificant, and out of all proportion to the capacity of production. The mills are turning their attention more to Skelp Iron, which seems to be in steady demand, although prices are so low as to leave little or no margin for profit. It helps to keep the mills at work, however, and by piecing it out, four or five days on Skelp and a day or two on Bars, they manage to keep running. The demand for Bars is still confined to small lots as wanted; the trade is, therefore, very irregular and uncertain. Prices are without change, except on Common, which is a little weaker.

**Plate Iron.**—At present is more uniformly steady than any other description, and although rates do not leave much margin for profit, it is a little satisfaction to be able to find a market at some price. There is an inquiry for this class of Iron for San Francisco (large quantities, it is said), but we do not hear of any actual sales.

**Sheet Iron.**—Is still dull, but there is a little more doing than for the past few weeks. We may say in regard to all kinds of Manufactured Iron that there is just a shade better feeling in anticipation of an improvement, but so far as actual business is concerned the market remains about as before. We hear of sales of 1000 to 2000 tons Skelp Iron, and some of the pipe manufacturers seem to be pretty well employed. The City of Philadelphia Gas Co. have just made a contract with a firm in Reading, Pa., for 2300 tons Cast Iron Pipe, price not stated, but said to be very low. We quote:

Bar Iron, 190c. to 2c.; for Ordinary Brands, and 2-20c. to 2-25c. for Best Refined; Tank Iron, 25c. to 3c. and upward, according to quantity and quality; Skelp, 2½c. to 2½c.

**Horseshoe Iron.**—The demand is moderate, and prices without change, say, \$67.50 to \$69 for 1½c. and 2½c.

**Steel Rails.**—We have not much of importance to report in this department, and so far as we can learn no large contracts have been closed for some time past. There is a moderate amount doing in small lots of a few hundred tons each, but there is no anxiety to operate heavily, and probably the financial position of many companies compels them to limit their purchases as much as possible. The nominal rate is still \$50 at mills, but we hear of sales as low as \$48 to \$49 for quantities of 500 up to 2000 tons each, and buyers of large lots for prompt cash and delivery would probably secure some concessions on these rates. The market is quiet, and with a limited demand we expect lower prices. Merchant Bars are quoted at 190c. @ 2c.; Hoop Iron, 180c. rates; Sheet Iron No. 24, 30c.

**Nails.**—The market continues dull, and but few of the mills either here or at Wheeling are in operation; however, an increased trade with the next few weeks is confidently expected. No change in prices; \$2.85, 60 days for less than 200 kegs, and \$2.75, 60 days, for 200 kegs and upward. At the meeting of the Western Association last week no business of any importance to the general public was transacted.

**Horse and Mule Shoes.**—Business is improving somewhat, although it is still short of what it should be and usually is at this particular time. No change in prices. Shoemacher & Co. still quote Horseshoes, in 100 keg lots, at \$4.50 per keg each, and Mule at \$5.50.

**Steel.**—There is an increasing demand for all the leading grades of Steel, and nearly if not all the mills are in operation; some of them are quite busy. Moreover, the indications are that they will have a demand sufficient to absorb their entire production all this year, as the low price has increased the consumption and stopped the importation of foreign Steel. German Steel is quoted at 6½c.; Plow, 8c.; Tool, 12c.

**Coke.**—There is a fair business, but no improvement in prices; \$2.25 to \$2.50 per ton, delivered free on cars in Pittsburgh.

**Coal.**—By the breaking of the ice in the Monongahela River a very large quantity of Coal was sunk; loss estimated at fully \$1,000,000, which, in connection with the increased cost of mining, has stiffened up the market very considerably, and a sharp advance below is almost certain.

**Petroleum.**—The refining business continues dull, and nearly all the "Standard" refineries have been stopped. It seems that the exporters are refusing to buy, and the home trade demand is not as brisk as it was last month, notwithstanding the price has been reduced from 27c. to 24½c. per gallon.

**Glass.**—All branches of the Glass trade continue very dull, and while some of the factories are stopped, but very few of those in operation are working up to more than one-half of their capacity.

**Scrap Iron.**—There is very little doing in Scrap Iron, but as the demand and supply is about equal, prices remain as before. Good qualities can be bought at our inside figures, and only selected lots bring the highest quotations, say: Cast, \$15 to \$17; Wrought, \$24 to \$26.

**Nails.**—The demand continues light, but prices do not vary, and we repeat quotations, \$2.90 to the trade and \$3.15 to consumers.

**Tin Plates.**—A fair business is passing considering the general dullness, and prices are steady. A good demand is anticipated as spring approaches. We quote in U. S. currency as follows: I C, 10x14, \$8 to \$25; I X, 10x14, \$10.25 to \$10.50; Best Charcoal Leaded, 28x30, \$15.50 to \$17; other good brands, \$14.25 to \$14.75; good fair, \$13.50 to \$14.50; Bright Tin in Cans, &c., \$6.50 to \$7.25; good Bright Tin, do. \$7 to \$7.37½; Coke Leaded, 14x20, \$6.50 to \$6.75.

**Lead.**—We hear of sales of 250 tons Ordinary Domestic at \$6.12½ to \$6.15, currency, now at \$6.20 to \$6.25; also, 300 tons best Soft Missouri at equal to \$5.95 to \$6 f. o. b. at St. Louis; and 300 tons Pennsylvania Refined. Trade is sluggish now in Shot, Pipe and Sheet Lead. Manufactured continues firm at old quotations. The corrodors of White Lead complain of dullness in sales, even at reduced

prices, for Manufactured, but are keeping their stocks up, ready for a hoped-for fair spring trade. The decline of gold reduces somewhat the cost of Foreign Lead, but it is still too high to compete with Domestic. We quote: Bar, 8½c.; Pipe, 9c.; and Sheet, 9½c., less 10 per cent. to the trade.

**Shot.**—Quiet at the following quotations: Drop Shot, 25 lb. bags, 9½c.; do., 5 lb. bags, 10c.; Buckshot, 25 lb. bags, 10½c.; do., 5 lb. bags, 11½c.; Conical Balls, 25 lb. bags, 10c. per lb., net; Bar Lead, 5 oz., ½c.; and 1 lb. bars, 8½c., less 10 per cent. to the trade.

**Old Metals.**—The demand continues light, and offerings in excess of requirements. We quote: Heavy Old Copper, 16c. to 16½c.; Light Tinned Copper, 14c.; Copper Bottoms, 13½c.; Heavy Red Brass, 13c.; Light Red Brass, 12½c.; Heavy Yellow Brass, 11c.; Light Yellow Brass, 10c.; Heavy Clean Pipe Lead, 5c.; Junk Lead, 5c.; Tea Lead, Light Paper, 5c.; Tea Lead, Heavy Paper, 5c.; New Zinc Clippings, 4½c. to 4½c.; Old Sheet Zinc, 4c.; Yellow Brass Turnings, 8c. to 9c.; Red Brass Turnings, 10c. to 11c.; Plumbers' Lead Joints, 6c.

#### PITTSBURGH.

Office of *The Iron Age*, 20 Fifth Avenue, Pittsburgh, Jan. 16, 1877.

**Pig Iron.**—There has been an increased business during the past week, and a better feeling prevails on the part of sellers, although buyers are still adhering closely to the hand-to-mouth policy, and prices remain unchanged. The market is still firm for Standard Mill Irons, the supply of which is very much reduced, not only here but at the source of supply, but poor stock is offering freely, and that too at prices in buyers' favor. As the mills that were stopped taking stock are started up, the consumption of Pig, of course, must increase, and this in connection with a light production and reduced supply has stiffened the market somewhat, especially as regards good brands. Bituminous Coal and Coke—No. 1 Foundry, \$24 to \$25, 4 mos.; No. 2 ditto, \$22 to \$23; Gray Forge, \$21 to \$22; White and Mottled, \$18 to \$19. Hanging Rock Charcoal—No. 1 Foundry, \$27 to \$29, 4 mos.; No. 2, \$25 to \$28; No. 3, \$23 to \$24. Cold Blast—\$35 for Eastern, and \$45 for Hecla.

**Manufactured Iron.**—There has been no perceptible change in the situation during the past week; business continues dull, more so than usual, but it is hoped and expected that orders will soon commence to come forward freely. It is pretty generally conceded by all who are in any way cognizant of business that hardpan has been reached; current rates, it is claimed, scarcely cover actual cost of production, hence buyers need have no apprehension in stocking up, and there is no good reason why they should hold back their orders in expectation of lower prices. Merchant Bars are quoted at 190c. @ 2c.; Hoop Iron, 180c. rates; Sheet Iron No. 24, 30c.

**Nails.**—The market continues dull, and but few of the mills either here or at Wheeling are in operation; however, an increased trade with the next few weeks is confidently expected.

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prices, for Manufactured, but are keeping their stocks up, ready for a hoped-for fair spring trade. The decline of gold reduces somewhat the cost of Foreign Lead, but it is still too high to compete with Domestic. We quote: Bar, 8½c.; Pipe, 9c.; and Sheet, 9½c., less 10 per cent. to the trade.

No. 2 Foundry ..... 17.00 @ 18.00  
Gray Forge ..... 16.00 @ 16.50  
White and Mottled ..... 15.00 @ 15.50

#### HOT BLAST CHARCOAL.

No. 1 Foundry, extra ..... \$20.00 @ 21.00  
No. 1 Foundry ..... 18.50 @ 19.50  
No. 2 Foundry ..... 17.50 @ 18.00  
Gray Forge ..... 17.00 @ 17.50  
White and Mottled ..... 15.00 @ 15.50

#### COLD BLAST CHARCOAL.

Car Wheel Metal ..... \$23.00 @ 28.00  
" extra standard ..... 30.00 @ 33.00  
Forge Metal ..... 17.00 @ 20.00  
Muck Bar ..... 15.00 @ 15.50  
Old Hails ..... 17.50 @ 18.00  
No. 1 Wrought Scrap ..... per lb.  
No. 2 Wrought Scrap ..... ½c. @ 1½c.

#### ST. LOUIS.

**Messrs. SPOONER & COLLINS**, Iron commission agents, 409 North Third street, St. Louis, under date of Jan. 11, report the Iron market as follows: Our market remains dull and inactive, as is usual at this season. Prices are about the same, with an upward tendency. Demand only fair. We quote same as last:

#### CHARCOAL.

Missouri No. 1 Foundry ..... \$23.00 @ 25.00—4 mos.  
" No. 2 Foundry ..... 22.00 @ 23.00—4 mos.  
" Gray Mill ..... 22.00 @ 23.00—4 mos.  
Hanging Rock No. 1 ..... 22.00 @ 23.00—4 mos.  
" No. 2 Foundry ..... 22.00 @ 23.00—4 mos.  
" Gray Mill ..... 22.00 @ 23.00—4 mos.  
Tennessee No. 1 Foundry ..... 23.50 @ 24.00—4 mos.  
" No. 2 Foundry ..... 22.50 @ 23.00—4 mos.  
" Gray Mill ..... 22.50 @ 23.00—4 mos.

#### COKE.

Alice H. R. Ex. No. 1 F'dry ..... \$26.00 @ 25.00—4 mos.  
" No. 1 F'dry ..... 25.00 @ 26.00—4 mos.  
" No. 2 F'dry ..... 24.50 @ 25.00—4 mos.  
" No. 2 F'dry ..... 23.50 @ 24.00—4 mos.  
" Forge ..... 23.50 @ 24.00—4 mos.  
Chattanooga, Tenn., No. 1 Foundry ..... 25.00 @ 26.00—4 mos.

#### STONE COAL.

Missouri No. 1 Foundry ..... \$25.00 @ 26.00—4 mos.  
" No. 2 Foundry ..... 23.00 @ 24.00—4 mos.  
" Gray Mill ..... 22.00 @ 23.00—4 mos.  
" White and Mottled ..... 21.00 @ 22.00—4 mos.

#### COLD BLAST CHARCOAL—All Numbers.

Hanging Rock ..... \$35.00 @ 46.00—4 mos.  
Tennessee ..... 30.00 @ 33.00—4 mos.  
Kentucky ..... 30.00 @ 30.00—4 mos.  
Missouri ..... 28.00 @ 30.00—4 mos.  
Georgia ..... 28.00 @ 30.00—4 mos.  
Alabama ..... 28.00 @ 30.00—4 mos.  
No. 1 Wrought Scrap ..... 95 @ 12½c. rates.  
Heavy Cast ..... 70 @ 10c.  
Light Cast ..... 40 @ 8c.

#### CLEVELAND.

**Messrs. C. E. BINGHAM & CO.**, 25 West Main street, under date of Jan. 15, quote the Iron market as follows, 4 mos. time:

#### FOUNDRY IRON.

No. 1 Lake Superior Charcoal ..... \$26.00 @ 24.00—4 mos.  
No. 2 ..... 25.00 @ 23.00—4 mos.  
No. 1 Anthracite ..... 24.00 @ 23.00—4 mos.  
No. 2 ..... 23.00 @ 22.00—4 mos.  
No. 1 Bituminous ..... 24.00 @ 23.00—4 mos.  
No. 2 ..... 22.00 @ 21.00—4 mos.  
No. 1 Cherry Valley Am. Scotch ..... 24.00 @ 24.00—4 mos.  
B-1 ..... 23.00 @ 22.00—4 mos.  
No. 2 ..... 22.00 @ 21.00—4 mos.  
No. 1 Massillon ..... 24.50 @ 24.00—4 mos.  
B-1 ..... 23.00 @ 22.00—4 mos.  
No. 2 ..... 21.00 @ 20.00—4 mos.

#### CAR WHEEL AND MALLEABLE IRON.

No. 3 Lake Superior Charcoal ..... \$26.50 @ 24.00—4 mos.  
No. 4 ..... 27.00 @ 24.00—4 mos.  
Nos. 5 & 6 ..... 27.00 @ 24.00—4 mos.

#### BESSEMER IRON.

no change in Marseilles. Business in the Iron branch has been more quiet than ever during the week under review, nobody seeming inclined to enter upon new engagements. This has special reference to all material for railways, and is in some measure due to the duty question in Germany, where a discrimination has been made against Iron and Steel, on which an export bonification had been given. Coal is in a highly unfavorable position, being still on the decline. While stocks are increasing the demand for the winter does not come up to expectations. Still it is not easy to explain why Coal consumption has diminished as much as it has done, the winter being by no means a mild one. To some extent it may be due to extreme economy among the poorer classes.

## BELGIUM.

(Revue Universelle).

BRUSSELS, Dec. 31, 1876.—*Iron.*—For a long time past we had not been able to chronicle a single so far as all feature as regards the Iron trade, and the winter winds up under an unfavorable aspect, there evidently being a lack of demand from all quarters preventing prices from recovering. All we have to do under the circumstances is to follow the example set by our neighbors across the Channel, who have vigorously remedied the evil that weighed on their Iron industry by procuring new outlets abroad. We would call attention to the tenders issued by the Hamburg Iron Company in tons of 900 lb. Bessemer rails, and also to 3400 tons due for similar purposes at Münster, Westphalia. The removal of the duties in Germany throws open a great field to Belgian and English Iron industry, and as long as the said duty is not reimposed, it is to be hoped that we shall make the best of it. Coal still suffers from the want of animation noticeable in Iron matters, and prices are stationary; they could hardly go up, for producers have made concessions to the utmost of their ability, and cannot go further.

## GERMANY.

(Borsenkalte).

HAMBURG, Dec. 30, 1876.—*Metal.*—We are now just entering in a year of great importance in an experimental sense to German Iron and Steel industry; we mean the abolition of the duties, with the exception of such goods as shall have been allowed an export premium elsewhere. This is a pet scheme that had been nursed in high quarters, and encountered most strenuous opposition in industrial circles of Germany. It will now be shown whether our industry has got vitality enough to make headway successfully against English and Belgian articles in the market. Copper has been quiet, as is nearly always the case at this time of the year. At Berlin, good qualities English and Australian fluctuate between £2 and £6 marks, while Mansfield commands 88/50 to 89 the 50 kilos. At Stettin, English is quoted 9/1; there is no alteration here. We quote: Minnesota, 108; Quina, 9/2; Tough Cake, 87. In Tin there has been but a dragging trade, yet our markets are firm. At Berlin, Banca is worth 88/50 to 84 marks, and English 80 to 82. The change is at Stettin or more. In Lead there have been but slight fluctuations. At Berlin, Tarnowitz, Hartz and Saxonian remain tolerably firm at 23/20 to 23/25 marks; at Stettin, German is quoted 24 to 25, and Spanish 26 to 27. No change here. Speller has been generally weak and inactive in the various German markets. Silesian is quoted as follows: At Berlin, 23/25 to 23/25 marks; at Stettin, 23 to 25/25, and here 23/25 spot, and 24 to arrive.

## HOLLAND.

(Koch &amp; Vheren).

ROTTERDAM, Dec. 27, 1876.—*Tin.*—The market is quiet. Banca on the spot, has sold at 45/4 and subsequently at 45/4 guilders; it would not bring over 46 now. To be delivered from the January sale it has sold from 43/4 to 45. Some business has been done in Billiton at 44/4 guilders.

## EAST INDIES.

(Clark, Spence &amp; Co.).

GALLE, Dec. 8, 1876.—*Plumbago.*—Supplies have been small. Some purchases have been made on American account, and prices have slightly advanced. We quote: Lumps, £18; Chips, £7.10 to £8.10; Dust, 25 per ton, without export duty. (Gulfplumb, Wood & Co.)

PEKING, Nov. 18, 1876.—*Tin.*—Our chief staples have been in an active demand throughout the past week, which has been unusually quiet, and the consequence of higher quotations from London, a considerable rise in prices here during the last week has to be noted—a rise which was apparently but little affected by the advance in the rates of exchange. After issue of our last report the Tin market opened somewhat weaker, with small supplies, when, however, a better demand for India and China came up, soon followed by a good inquiry for Europe and the United States. For India, £8.10 to £8.97 per picul, paid in China and Europe, prices advanced, were made at £9.60 per picul. The market therewith continued steady at prices ranging from £30.50 to £30.75 per picul. Toward the close the market is slightly weaker, owing to the unfavorable political news from Europe and the excessive scarcity of money. The last transactions are reported at £31.20 to £31.45 per picul for unsmeled. About 6700 piculs changed hands, of which 6400 piculs for Europe and the United States and 300 piculs for India and China. Stocks, 2300 piculs.

## AUSTRALIA.

(Sydney Morning Herald).

SYDNEY, NEW SOUTH WALES, Oct. 26, 1876.—*Tin.*—Our Tin lands are of great extent, several hundred square miles being more or less stanniferous, but it is a broken country; carriage is high, and the price of Tin low at home, and a long and fatiguing journey for directors to take if they wish to see what is really doing, but tribute parties do well, and there is such a wide field to pick and choose in, only working the very choice spots or those near to the coast can be had; so some time ago we went through the district, which will probably be within the next two or three years, thousands of acres will pay well to work, if a little capital is first laid out in cutting roads and buying water, though water is not generally difficult to get there, as it is a country of creeks and springs, as compared with most parts of the colony. The alluvial being so easily worked, little attention has yet been paid to the land, but a few are known to exist, though some have been partly worked, as also a deposit of tin. Tin has been lately found in ridges, and far above the ordinary wet workings, there is, doubtless, profitable employment for skill and capital for ages to come.

## Our English Letter.

Review of the British Iron, Steel, Metal, and Hardware Trades.

(From our regular Correspondent.)

SHEFFIELD, ENGLAND, Jan. 1, 1877.

NEW YEAR'S DAY,

on which I write, is a dies non so far as business is in question, particularly in Scotland, where the observance of Christmas Day as a holiday is anything but general. In England, *le Jour* has of late years become an institution which we have learned to observe in a festive manner befitting the season. Our old acquaintance, 1876, died very calmly and quietly in point of weather here. He was a moist and rainy old year throughout, and his obsequies were suitably presided over by Jupiter Pluvius. No snow or frost watched the departure of his spirit, nor have they ushered in 1877, for as I now sit I look forth and see that the rain is falling fast, and that the country—of which in fine weather I have from my window a magnificent view, beginning in a foreground of suburban gardens, and sweeping up over a well wooded middle distance into a background of purple blue moorlands which kiss the clouds—is in a state of mildew and foggy ferment. Of the

year which departed at midnight a good deal has been written and said which might very well have been unachieved, and which I shall not seek to emulate; firstly, because I have not space; secondly, because—but the first reason is ample. Of 1877 we know little but hope much. We cannot penetrate the future, but we may, at all events,

"Have a heart for any fate,  
Still achieving, still pursuing,  
Learn to labor and to wait."

## THE STORMS AND FLOODS

of the past ten days have been most disastrous on our north and northeastern coasts, the wrecks which have taken place having caused great loss of life. In Scotland about Christmas the Highland railways were totally blocked up by the snow, several passenger trains being snowed up for a whole night.

## IRON WORKS COMPANIES.

Among the meetings of the past few days have been those of the Nantyglo-and-Blaenau Iron Works and of the Russian Iron Works Company. At the former the report presented showed a loss of £63,200 on the year's transactions. Future prospects were well spoken of. At the Russian Co.'s meeting, in London, the balance sheet showed the capital stock to remain at £22,700, and that the company's share of the year's profits was £2400.

## ANOTHER FATAL RAILWAY ACCIDENT.

Following the Arlesay catastrophe, we have had a collision at Antrim, in Ireland, whereby one passenger has been killed and a dozen injured. Other minor casualties have also taken place.

## MORE FIRES.

The week's fires have been on a pretty numerous scale. At Dundee the new South Mill was burned down, causing one man to lose his life, and much damage. At Hartlepool the premises of Mr. Cooper were destroyed, and several persons narrowly escaped death.

## NORTHERN IRON TRADE.

Mr. Waterhouse, the official sworn accountant to the Northern Board of Arbitration, has just issued his quarterly statement of prices and quantities. The particulars relate to the three months ending November 30, 1876, and are these:

Descrip.	Weights invoiced.	Ave. net Percentage price per ton of total ton.
Tons. C. Q. Lbs.	£ s. d.	
Rails... 18,499 18 2 6	17 59	
Plates... 46,226 1 0 10	44 00	
Bars... 24,063 11 1 2	22 02	
Angles... 16,776 5 2 4	15 49	
Total, 105,085 16 1 22	100 00	

By comparing these figures with the sales and selling price for the corresponding quarter of last year, it appears that there is a decline of 21,000 tons in the quarter's production of iron rails, and a decline of 19/ in selling price as between the two periods. Against this there is an increase of nearly 10,000 tons in the quantity of plates.

## TRADES OF SHEFFIELD.

I can say little or nothing with respect to the state of trade now existing, but one may, at least, glance back at the main features of the year now ending, and try to peep into the prospects of the immediate future. Of the year 1876 there is little to be said which can bear a favorable construction, except that it leaves the iron trade in no worse condition than it found it. In the last quarter of the year it may, with some reservations, be said that trade has revived a little. This is, perhaps, now seen in respect of the iron trade, but for a long time it only appeared to affect the hardware industries. On the other hand, the Bessemer departments—especially those devoted to rails—are very irregularly engaged, some of the leading establishments being almost at a standstill in this respect. There has, nevertheless, been a steady diminution in the cost of producing this valuable material, and it cannot be a matter of any doubt that it will in the future be more in request than it has ever yet been. The old cast steel trade of the town has languished all the year, and is now in an extremely dull condition, albeit in the meantime some of the leading houses have lowered the wages of their men, and in other ways have cut down working expenses to a minimum. The American market has evidently collapsed for a long time henceforward, so far as this trade is concerned; but there is no reason for supposing that when the energies of the world are again fully aroused, Sheffield steel will not be as largely sold as in former times. It is, at all events, certain that up to the present no substitute has been discovered for the best tool steels produced here, although Bessemer material has to a certain extent taken the place of the commoner kinds of cast steel.

Of the future very little can be said. Some of our ironmasters believe that the current inquiries will lead to a decided amelioration early in the new year. Others think that it will be nearly midsummer before any decided change will be felt. In any case the smelters are firmer than they were some time ago, and even the merchant iron producers are beginning to feel a little more courageous.

In the steel rail industry some of the larger mills are at a standstill, and have hardly any orders on hand, while other houses are producing 1000 to 1200 tons weekly, and the hardware are fairly situated, but I fear that some of them will not be active for some weeks, or even months, henceforward. Edge tools and engineering requisites will continue to be turned out pretty largely.

Of the coal trade it is unnecessary to speak in detail. The markets are all glutted, there is a limited demand, and new collieries are being opened out on all sides—a state of things which must keep down prices.

The Sheffield *Independent* publishes a lot of figures pretending to show the trade of Sheffield with various countries. They do nothing of the kind. They are the figures for eleven months only, setting forth, from the Board of Trade returns the hardware and cutlery exports of the whole country. I believe that there is a little hardware made at Birmingham, Wolverhampton and other small places in that district. Therefore, I warn the Sheffield and Rotherham *Independent* that it won't do to play those figures off. They are singularly thin.

## BIRMINGHAM AND STAFFORDSHIRE.

In "these parts" the holiday period also reigns supreme, so that there are few days whereby to found business statements or comparisons. In the meantime prices appear to be firm, and are not likely to be altered at the forthcoming quarterly meetings. Marked bars are steady at 29 and common at 26 5/ to 28, but the "list" is by many firms wholly disregarded, and marked bars are obtainable from them at 28 to 28 10/ per ton. The hardware industries are moderately well off for orders. The home government has just given out an order for 30,000 Martini rifles to the two old companies of London and Birmingham. The Birmingham Small Arms Co. has secured an order for 7000 Snider rifles, and the National Company one for 3000 Sniders. The *Globe* (London), writing on this particular industry, urges that

we ought to make a desperate effort to maintain our supremacy in it and keep ahead of the United States.

WALES AND MONMOUTHSHIRE

remain quiet, last week's output having been about 2500 tons, including 1700 tons of rails, mostly from Dolwals and Blaenau. The tin plate works are fairly supplied with orders, and in the general trades of the district prospects are said to be brighter than before Christmas.

## THE METAL MARKETS

have been fairly steady, considering the uncertainty of the Eastern question and the holiday interruptions.

Von Dadelzen & North say: "Copper has kept its position well, and although no transactions of importance have transpired, the price of Chili bars has advanced about 20/ per ton, g. o. b. bars from £76 to £76 10/; named and best brands up to £77.10/." Australian sorts quiet, but steady; Wallaroo nominally £85.10/; Burr, £84.10/; English quiet; tough, £80 to £88; strong sheets, £80 to £90. Tin has been dull, and lower prices have been accepted. Straits has been sold from £76 to £75, spot and forward, and Australian from £75 to £74. English is dull; common Ingots, £79; bars, £80. The Dutch market is almost nominal; Banca, 44/ fl.; Billiton, 44/ fl. to 44/ fl. Tin plates reported to be in better demand, and more particularly common cokes; prices rather firm. Lead is slow of sale; good soft English pig, £21.15 to £22; Spanish silver lead, £21.7.6 to £21.10. Speller has further declined in price; common Silesian is quoted £21.5 to £21.10/; special brands in exports from 5 to 10/ extra. *Quicksilver*.—Dull at £8.11."

## IRON IN CAR CONSTRUCTION.

On page 14, of the issue of January 11, of *The Iron Age*, attention was called to the use of iron for freight cars. The National Tube Works, of Boston, Mass., and McKeesport, Pa., are building, under the La Motte patents, freight cars (platform and box) out of wrought iron tubes and steel rods. A platform car carrying stone and a box car carrying ice have been running for eighteen months without a dollar of repairs. The loads they have carried are only limited by the strength of the trucks and springs. The common load of the stone car has been up to 15 tons, and that of the ice car, which has 1900 cubic feet of freight space, has been 20 tons. The saving of dead weight in these cars is as follows; the wooden cars in the same train carrying stone, weigh 11,560 pounds; the iron car 5214 pounds; the wooden ice cars weigh 16,400 pounds; the iron ice car weighs 8400 pounds. The platforms were tested by piling 10 tons of railroad iron crosswise in the center of the car on the smallest base possible, and the deflection was only 5/ of an inch, which disappeared as soon as the load was removed. There is a novelty in the principle of construction that makes it, as it were, self-sustaining. In case of accident they cannot splinter, break or burn. There is a saving of from two to four tons dead weight on each car, their weight carrying capacity being at least 50 per cent. greater. The saving of repairs is from 50 to 75 per cent. The National Tube Works Co. will be happy to give any information, and to show the cars which have been running 18 months.

## Cause of Error in a Thermometer.

Mr. H. C. Russel publishes notes on some remarkable errors in thermometers recorded at Sydney Observatory, 1876. For upward of five years the same hygrometer has been in use at the Observatory. The dry bulb is small, only 0.3 inches in diameter, and the instrument, up to February 26th, had always given very satisfactory readings, tested by those of a standard which hangs only 3 inches from it. The difference in the readings was usually 0.2° to 0.3°. On Saturday last the market remained unimproved, a small parcel of Straits was reported to have been sold at £75.10/ to £76, cash, and 5 tons of Australia at £75. Lower prices were accepted on Wednesday, the cash price for Australian being £74.10/ and Straits £75.10/ and £75 for December-January shipment. The downward tendency made further progress on Thursday, and sales of 50 tons of Straits were made at £75, cash, also for January and March delivery, and at £74.10/ for December-January shipment. In Australian 25 tons at £74, cash, or 10/ per ton lower than on the previous day.

Latest Liverpool prices are:

Iron: f. o. b. in Liverpool, per ton.	£ s. d.
Merchant bar	6 15 0
Merchant bar, in Wales	5 0 0
Staffordshire	7 5 0
Hoop	8 0 0
Sheet	9 5 0
Nail rod	7 10 0
Bast, best crown	7 5 0
Boiler plates	9 5 0

*Tin Plates: f. o. b. in Liverpool, per box.*

£ s. d.	
Charcoal, L. C.	1 5 0
Coke, L. C.	1 0 0

*Copper: Delivered in Liverpool, per ton.*

£ s. d.	
Bolt and Sheathing	92 0
Title	85 0
Tough cake	85 0
Best selected	87 0

*Lead: Delivered in Liverpool, per ton.*

£ s. d.	
Charcoal, L. C.	1 5 0
Coke, L. C.	1 0 0

*Charcoal: Delivered in Liverpool, per ton.*

£ s. d.	
Charcoal, L. C.	1 5 0
Coke, L. C.	1 0 0

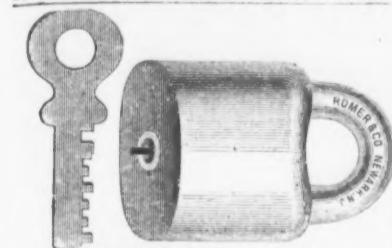
*Charcoal: Delivered in Liverpool, per ton.*

£ s. d.	
Charcoal, L. C.	1 5 0
Coke, L. C.	1 0 0

*Charcoal: Delivered in Liverpool, per ton.*

£ s. d.	
Charcoal, L. C.	1 5 0
Coke, L. C.	1 0 0

**WILSON BOHANNAN**  
Manufacturer of Patent  
**BRASS**  
**Pad Locks,**  
FOR  
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AND THE HARDWARE TRADE.  
All sizes, with Brass and Steel  
Keys, with and without chains.  
**PASSENGER CAR LOCKS,**  
Bronzed, Nickel-Plated and Japanned.  
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Established 1857. Manufacturers of Patent Scandinavian  
Brass Pad Locks for Railroads and  
Switches. Also, Patent Stationary R. R. Car Door  
Locks, Patent Piano and Sewing Machine Locks,  
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Wrought Iron Riveted  
Lattice Railroad

AND  
HIGHWAY BRIDGES.

Wrought Iron  
WATER PIPE.

The most economical and durable Pipe manu-

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General Riveted Work

Orders Solicited from Civil Engineers  
and Contractors.

[Accompanying engraving represents the Spring-  
field Bridge, built by the Leighton  
Bridge and Iron Works.]

## L. COES' Genuine Improved Patent SCREW WRENCHES.

Manufactured by

**L. COES & CO.,**  
Worcester, Mass.



Established  
In 1859.  
Registered March 22, 1874.

We invite the particular attention of the  
trade to our New Straight Bar Wrench, *widened*,  
full size of the larger part of the so called  
"reinforced or jog bar." Also our enlarged jaw,  
made with ribs on the inside, having a full  
bearing on the front of bar (see sectional view),  
making the jaw fully equal to *any* strain the  
bar may be subjected to.

These recent improvements in combination  
with the nut inside the ferrule firmly screwed  
up flush, against square, solid bearings (that  
cannot be forced out of place by use), verifies  
our claim that we are manufacturing the  
strongest Wrench in the market.

We would also call attention to the fact,  
that in 1869 we made several important im-  
provements (secured by patents), on the old  
wrench previously manufactured by L. & A.  
G. Coes which were *at once closely imitated*  
and sold as the *Genuine Wrench* by certain par-  
ties who seem to rely upon *our* improvements  
to keep up their reputation as manufacturers,  
and although the fact of their imitating our  
goods may be *good* evidence that we manu-  
facture a superior Wrench, we wish the trade *may*  
*not be deceived* on the question of *originality*.  
Trusting the trade will fully appreciate our  
recent efforts, both in improvements on the  
Wrench and in the adoption of a Trade Mark,  
we would caution them against imitations.  
None genuine unless stamped

**"L. COES & CO."**

Warehouse, 97 Chambers St., & 81 Reade Sts., N. Y.  
HORACE DURRIE & CO., Sole Agents.



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Hammer's M. I. Hanging Lamps.  
For Sale by all the principal Hardware Dealers.

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Of superior Quality, and Hardware Specialties in  
Malleable Iron made to order.

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**Six Saw Blades.**

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With full directions for using the Saw.

List price, per Box, \$1.25.

We have advertised these goods thoroughly  
throughout the country, and notified all interested  
persons that they could buy of the dealers at our  
regular rates. The demand for these tools is rap-  
idly increasing, and some of them are in use in  
almost every town. They will sell in every hard-  
ware store where shown.

**Millers Falls Company**

74 Chambers Street, NEW YORK,  
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## Silver's Patent Meat Stuffers.



Nos. 1 and 2. Single Geared.

Capacity of No. 1, 6 lbs. Weight of No. 1, boxed, 30 lbs. Price, \$6.00.  
Capacity of No. 2, 9 lbs. Weight of No. 2, boxed, 40 lbs. Price, 9.00.

FAMILY SIZES.



Nos. 3 and 4. Double Geared.

Capacity of No. 3, 12 lbs. Weight of No. 3, boxed, 60 lbs. Price, \$18.00.  
Capacity of No. 4, 20 lbs. Weight of No. 4, boxed, 75 lbs. Price, \$25.00.

BUTCHERS' SIZES.

THE BEST IN USE. SEND FOR CIRCULAR.

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## THE EAGLE ANVIL

(ESTABLISHED) 1843.



## !! WARRANTED !!

These Anvils are *superior* to the best English, or other Anvils, on account of  
the peculiar process of their manufacture (invented and used only by this concern),  
and from the quality of the materials employed.

The best English Anvils become hollowing on the face by continued hammering  
in use, on account of the fibrous nature of the wrought iron—causing it to "settle"  
under the face.

The face of the Eagle Anvils is of crystallized iron, and no settling  
occurs; the steel face, therefore, remains perfectly true. Also it has the great ad-  
vantage that being of a more solid material, and consequently with less rebound,  
the piece forged receives the full effect of the hammer, instead of a part of it being  
wasted by the rebound, as of a wrought iron anvil. An equal amount of work can,  
therefore, be done on this Anvil with a *summer one* *one-fifth lighter* than that required  
when using a wrought iron anvil.

The working surface is in *one piece* of JESUP'S BEST TOOL CAST STEEL, which,  
being accurately ground, is hardened and given the proper temper for the heaviest  
work. The horn is covered with and its extremity made *entirely* of steel.  
The body of the Anvil is of the strongest grade of American iron, to which the cast  
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Price List, Number 1, 1876. ANVILS weighing 100 lbs. to 400 lbs., \$1. per lb.

Smaller Anvils, 100 lbs. No. 00 0 1 2 3 4 5 6 7 8 9  
Weighting about 5 lbs. 10 lbs. 15 lbs. 20 lbs. 30 lbs. 40 lbs. 50 lbs. 60 lbs. 70 lbs. 80 lbs.

125 lbs. 175 lbs. 225 lbs. 275 lbs. 325 lbs. 375 lbs. 425 lbs. 475 lbs. 525 lbs. 575 lbs.

N. B.—These are the RETAIL PRICES. The only additional cost will be the freight to  
the purchaser's place of residence.

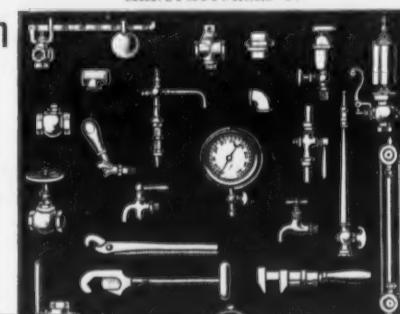
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58 John Street, New York.  
MANUFACTURERS OF

Wrought Iron  
PIPE,  
Cast Iron  
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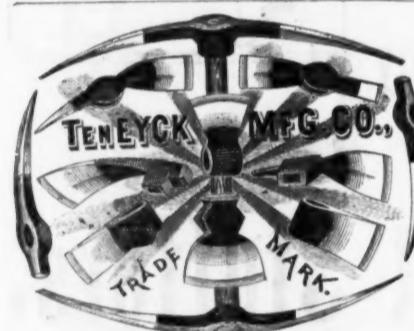
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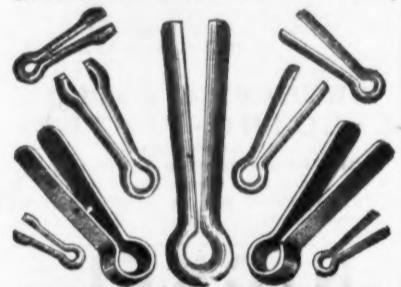
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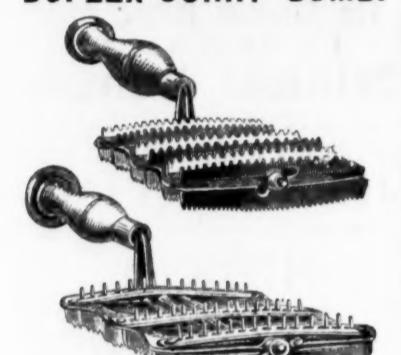


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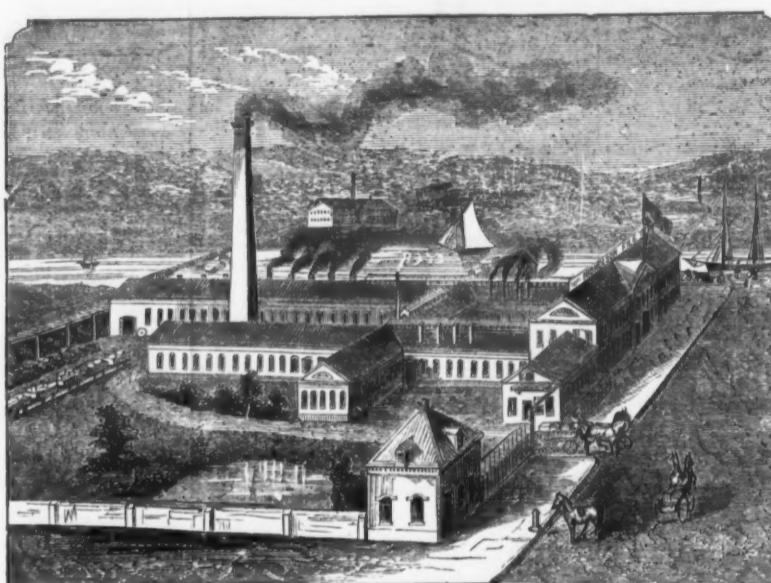
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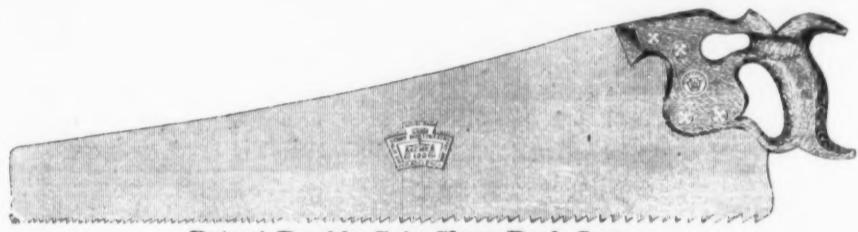
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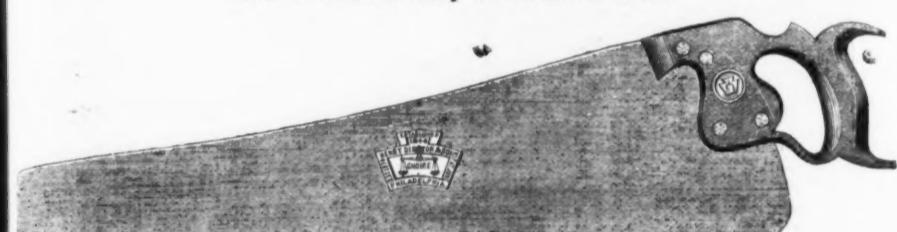
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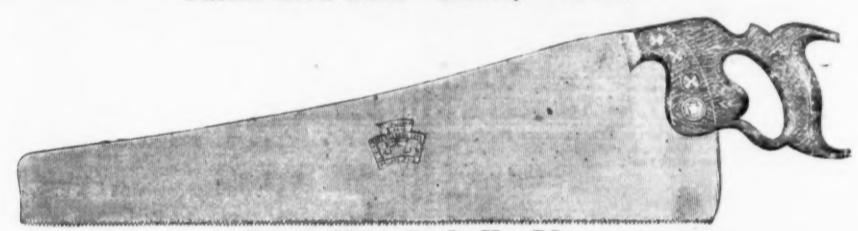
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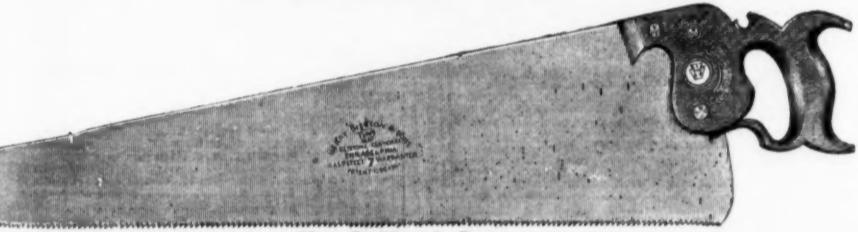
Patent Double Grip Skew Back Saw.



Patent Skew Back "Choice," No. 80.



Patent Skew Back, No. 76.



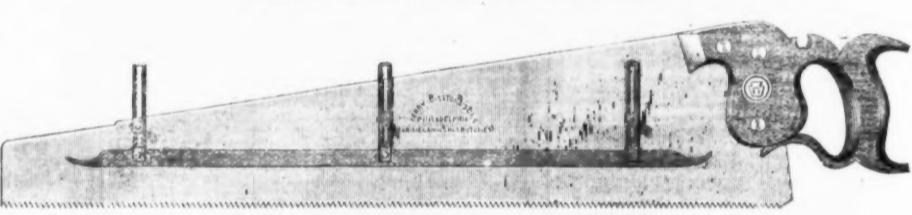
No. 7 Hand Saw.



Beveled Back Turning and Felloe Webs.



Patent Improved Combination Saw.



Patent Gauge Saw, Quality No. 7.

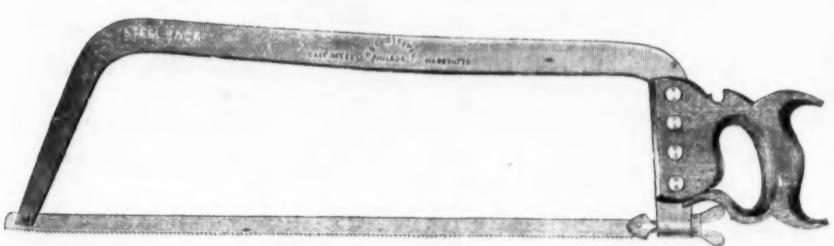


Patent Combination Saw, No. 29.



Hand Saw with Patent Adjustable Handle.

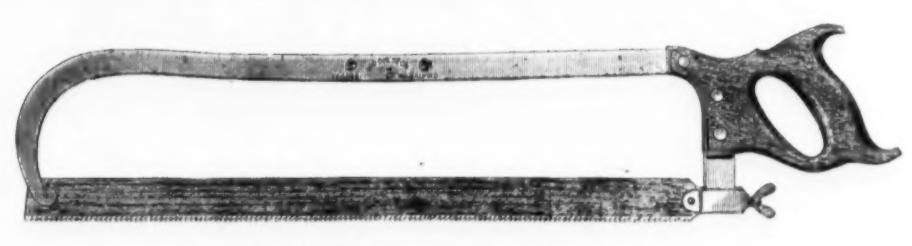
## BUTCHERS' BOW BACK SAWS.



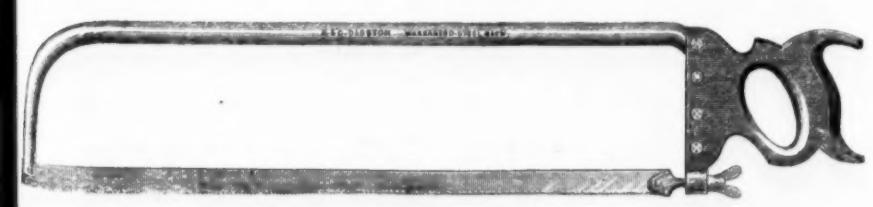
No. 1, California Flat Steel Back, Clock Spring Blades.



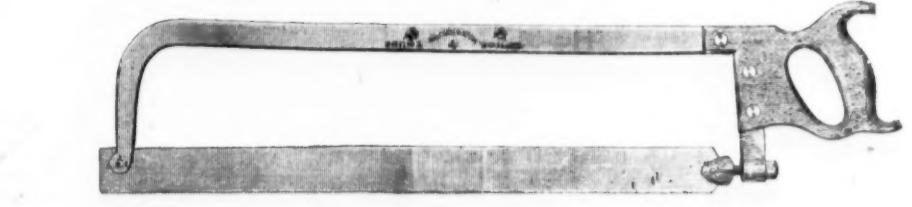
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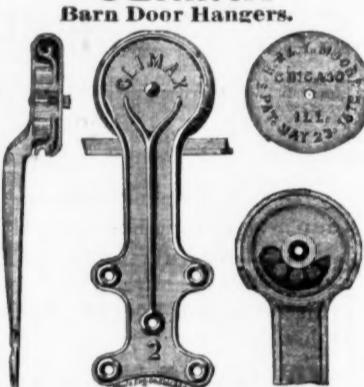
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Barn Door Hangers.

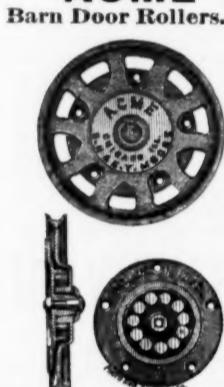


The "CLIMAX" Hanger is simple and substantial in its construction. A circular cap on the head contains a set of nine chilled iron rollers, within which the hub of the wheel revolves. The rollers run with the friction of a plain center pin which is the objection to the common wheel hangers. In the "Climax" there is the friction of rolling surfaces only. Other hangers have the wheel alone, or the rollers alone; the combination of both in the Climax makes it the easiest running hanger in existence.

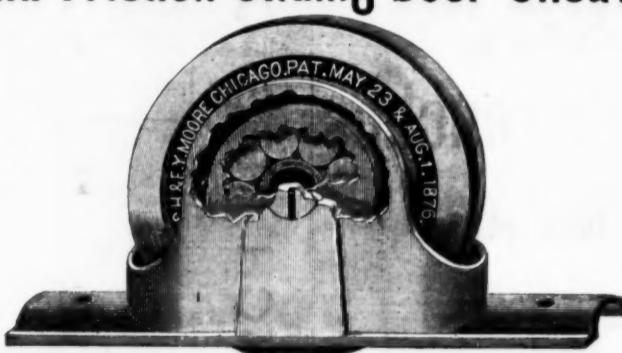
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Barn Door Rollers.



MOORE'S Anti-Friction Sliding Door Sheave.



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MOORE'S ANTI-FRICTION SLIDING DOOR SHEAVE, 4 inch wheel.	per set, 3.60

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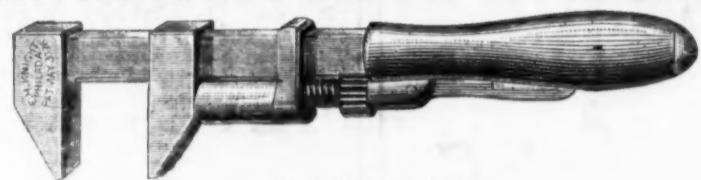
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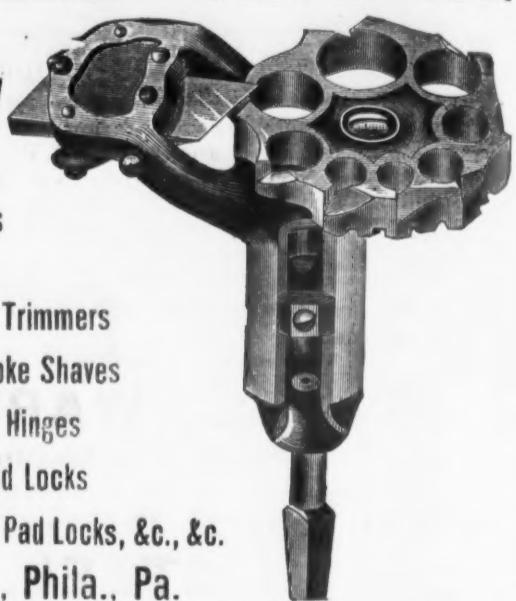
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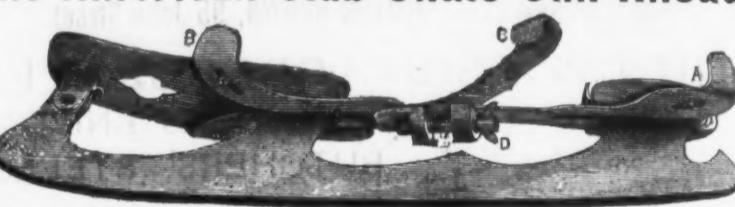
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Eng. Pattern. . . . . 25c 30c 35c 40c 45c 50c 55c 60c 65c 70c 75c 80c 85c 90c 95c 100c  
No. . . . . 80 100 120 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000  
Hart's Pattern. . . . . 25c 30c 35c 40c 45c 50c 55c 60c 65c 70c 75c 80c 85c 90c 95c 100c  
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" . . . . . 25c  
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" . . . . . 35c  
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Plated. . . . . 70c  
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Turkey Oil, No. 1. . . . . 70c  
Wasnts Extra. . . . . net 30c  
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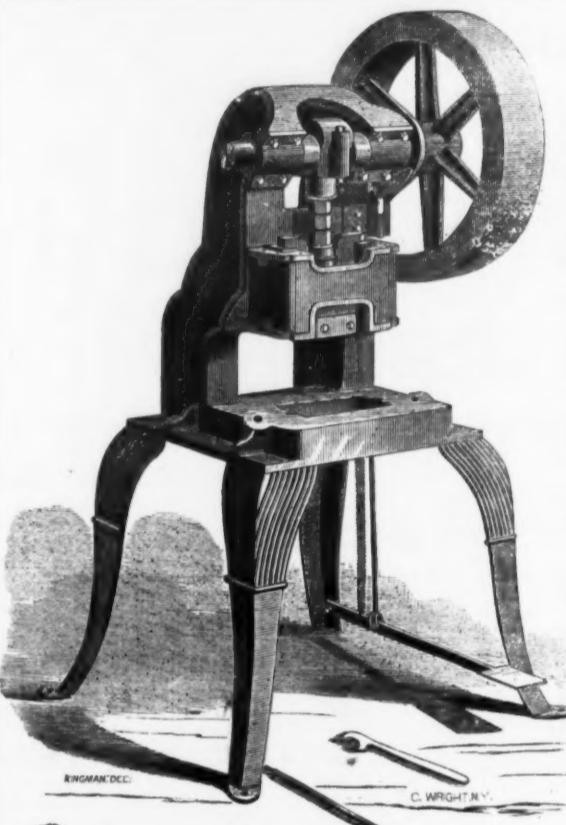
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**SCOTT'S BELLows**, 586 Water St., N. Y. J. CLARK WILSON & CO., Agents.

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**BRADLEY'S CUSHIONED HELVE HAMMER**

Has Won Golden Opinions from the Mechanical World during the four years it has been before the public, and has reached a sale of 500 Hammers, all in successful operation, in this and foreign countries.

It Has More Good Points, Less Complication, More Adaptability, Larger Capacity, Does More and Better Work, Takes Less Power, Costs less for Repairs than any Hammer in the World. GUARANTEED AS REPRESENTED, and "DON'T YOU FORGET IT."

Established 1832.

**BRADLEY MFG. CO., SYRACUSE, N. Y.**

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MAKER AND PATENTEE OF

**HYDRAULIC JACKS AND PUNCHES.**

ROLLER TUBE EXPANDERS

And Direct-Acting Steam Hammers.

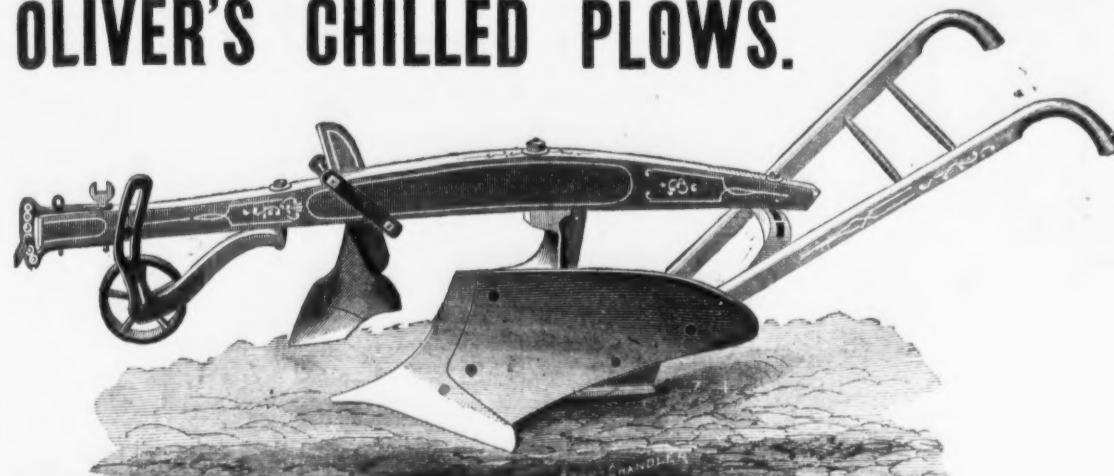
Communications by letter will receive prompt attention.

JACKS for Pressing on Car Wheels or CRANK PINS made to order

**SCOTT'S BELLows**, 586 Water St., N. Y. J. CLARK WILSON & CO., Agents.

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## OLIVER'S CHILLED PLOWS.



These implements, though but four years before the public in their present form, show the following remarkable record: 1506 were sold in the season of 1871. 7472 were sold in the season of 1873. 31,077 were sold in the season of 1875. 3919 " " " 1872. 14,976 " " 1874. 42,139 having been sold the past spring.

The sales for 1876, will undoubtedly exceed 60,000 Plows. For full descriptive circulars, address,

**SOUTH BEND IRON WORKS, South Bend, Ind.**

## CLARK'S PATENT EXPANSIVE BITS

Made of JESSOP'S BEST CAST STEEL, and warranted superior to any other

Two sizes: Large Size Boring,  $\frac{1}{2}$  to 3 inches; Small Size Boring,  $\frac{1}{2}$  to  $1\frac{1}{2}$  inches.

W. A. CLARK'S PATENT.

Manufactured by

**WILLIAM A. CLARK. - - - Westville, Conn.**

THE  
SAMSON WRENCH  
RECEIVED THE  
CENTENNIAL MEDAL AND DIPLOMA OF MERIT.



It is the only positive Wrench that will hold Gas or Steam Pipe, Gas Burners, Round Iron or Steel without slipping. Samples sent to the trade only, on receipt of fifty cents and business card.

**W. J. FLANAGIN & CO., Sole Manufacturers,**  
Office, 32 North 5th Street, PHILADELPHIA.

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Die Plates and Dies, Genuine Packer Ratchet Drills, Clamp, Die and Common Lathe Dogs, Barwick Wrench and Pipe Tongs, the Billings Patent Sewing Machine Shuttles, Marlin Spikes, Calkers' Tools, Clinch Rings, Saw Sets, Screw Drivers, And all description of IRON AND STEEL

Drop Forgings.

Send for a Circular.

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(PATENT APPLIED FOR.)

In presenting to your notice our **ULSTER SLED**, we introduce an article that has long been needed in the trade, viz., a light, yet strong and durable sled. This has been accomplished, as the entire running gear, runners and cross-bars, are formed by a single piece of metal. The hopes and efforts of the inventors and manufacturers of our country have been directed toward reaching, in this our Centennial year, perfection in their respective productions, and we now leave it to the public and their children to decide whether we have been successful or not.

Very truly,

**CROSBY GILZINGER & CO., Manufacturers RONDOUT, N. Y.**

The Famous Improved  
**SHEPARDSON LOCKS**

Are the "Best" in the World.

**The United States Lock Co.,**

Office and Manufactory, KINGSTON, MASS.

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**GOLD MEDAL**

**Non-Extensible Razor Belt.**

PATENTED JULY 25, 1871.

RE-ISSUED MAY 13, 1873, and JUNE 9, 1874.

In this Strap the liability of the leather to stretch and become loose and porous is prevented by the use of a patented non-extensible base, which supports the leather and secures

**PERMANENT ELASTICITY.**

We make this style with single rod, double rod, and wood frames, and intend that it shall, in quality compare favorably with our other well known brands.

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THE "DUCKHAM" PATENT  
Suspended Self-Indicating  
WEIGHING MACHINE.

Capacities from 1 to 100 tons.

This machine is used on a crane or any lifting apparatus, and indicates the weight on the dial directly the article is lifted. It is accurate, requires no adjusting, portable, and the newest labor-saving weigher ever introduced.

Send for Circular and Price List.

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Hydraulic Presses, Accumulators, &c.

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POWER LOOMS.**  
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Pulleys from 4 to 1000 lbs. in diameter,  
Pulleys from 4 to 1000 lbs. in diameter,  
Power Rotating Friction Pulleys.

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Paving Machine, Patent in  
Road Rollers and Traction Engine,  
All kinds of  
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Frame P. W. Wheel, Boston Made,  
No. 18, 18 in., 26c, 16 in., 20c,  
No. 18, 18 in., 26c, 26 in., 30c,  
Milled Axle, No. 2, 18 in., 42c, 27 in., 50c,  
Nashua Pat. Axle, Bronze Face, 15 in., 50c,  
Cast Steel Axle, 2 in., \$1.00

Pulleys, Portable Iron Railroad.

Alexander Bass' Patent Portable Iron Railroad.

Manufacturers of  
D. M. MEEKER & SON'S  
MALLEABLE IRON HOLLOW  
MUN-  
TEN WINDOW SASH.

For Insane Hospitals, Fire Proof Buildings, &c.

End view of  
Muntin for  
Un glazed Sash.

The use of these Sashes gives perfect security without  
the usual grating that have a prison like appearance  
wherever introduced. Architects and Medical  
Superintendents testify to their worth. Manufactured by

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Fine Castings of Malleable and Gray Iron, German  
Silver and Composition; also Patterns a specialty.

Patented June 9, 1874.

Hollow Muntin.

Patented June 9, 1874.

End view of  
Muntin for  
Glazed Sash.

Patented June 9, 1874.

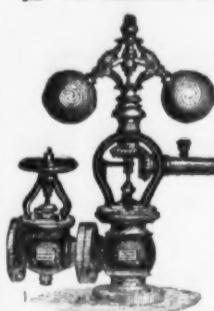
Patented June 9, 1874

## THE JUDSON GOVERNOR.

It is a common method to advertise Govs. *now without cost*, unless satisfactory to the customer, and then charge **High Prices** for doing what any good Governor will do. Various Governors inferior to the Judson are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor. Particulars concerning other Governors should stipulate that their durability be guaranteed, and should also take care that they do not, for much inferior Governors, pay higher prices than those shown in the accompanying list. We guarantee the Judson Governor will do all any other Governor can do, and in Accuracy and Durability—the main essentials—we guarantee it shall do more.

### Reduced Price List, JANUARY 25th, 1876.

For dimensions of Governor, see Illustrated Price List.

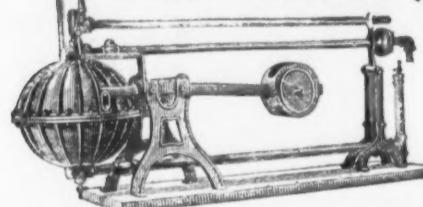


THE JUDSON PATENT Improved Steam Governor.

No Charge for Boxes & Cartage.

JUNIUS JUDSON & SON, Rochester, N. Y.

## The Albany Steam Trap.

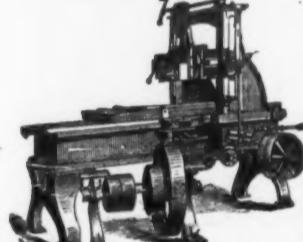


This Trap automatically drains the water of condensation from **Heating Coils**, and returns the same to the Boiler whether the Coils are *above or below* the water level in Boiler, thus doing away with pumps and other mechanical devices for such purposes. Apply to

Albany Steam Trap Company,  
Albany, N. Y.

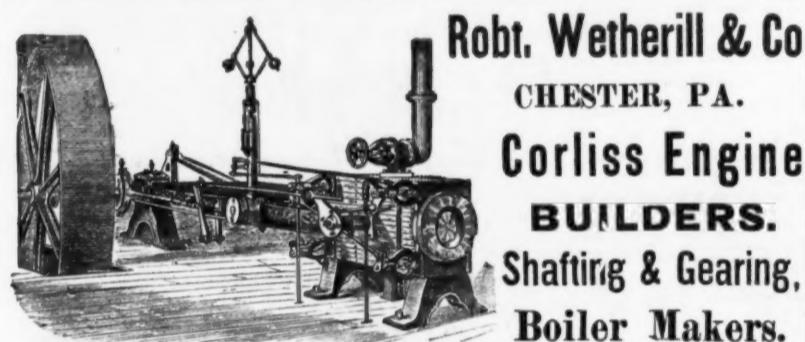
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Have constantly on hand and making



## Drop Hammers

Of recently Improved Construction. Pony Trip Hammers, Blacksmiths' Sheaves, Broaching and Stamping Presses, Iron Shop Cranes, Machinists' Tools, Gun and Sewing Machine Machinery. Make to order Gray and Charcoal Iron Castings of all styles and sizes not exceeding 15 tons weight, (making patterns if desired). Furnish Clamp Pulleys of light patterns, cut gears in a superior manner, &c., &c.



Robt. Wetherill & Co.  
CHESTER, PA.  
Corliss Engine  
BUILDERS.  
Shafting & Gearing.  
Boiler Makers.

## THORNE, DeHAVEN & CO., Drilling Machines, 21st Street, above Market, Philadelphia.

PORTABLE DRILLS. Driven by power in any direction.  
RADIAL DRILLS. Self-feeding—Large Adjustable Box Table.  
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HORIZONTAL BORING AND DRILLING MACHINES.  
HAND DRILLS. CAR BOX DRILLS.  
SPECIAL DRILLS. For Special Work.



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Machinists, Engineers, Pattern and Model Makers.  
Small Lathes for Steam or Foot Power. Designs and Drawings for  
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JAS. STARRETT, Machinery Dept't.

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There has long been a want of some device by which the straightening of shafting could be done without removing the work from the centers, and at the same time do it quickly and accurately. The

**SCOFIELD PATENT SHAFT STRAIGHTENER**  
meets just such a want; the apparatus is light and can be easily handled, yet it is of sufficient strength for the purpose required. It can be placed upon the shears of the lathe, and moved along the entire length of the work. It is especially

**Adapted to Removing Short Bends,**  
which frequently occur in long lengths of shafting. The lightness of the Straightener renders it eminently

**Adapted for Line and Counter-Shafting,**  
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It can also be used on the bench for short lengths.

For Circulars, Price List, &c., Address,

**C. SCOFIELD & CO.,**  
Vineland, N. J.



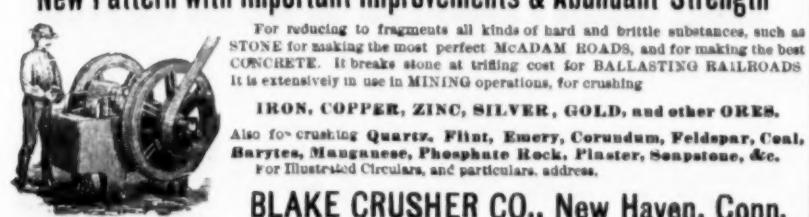
## BLAKE'S PATENT STONE & ORE BREAKER.

New Pattern with Important Improvements & Abundant Strength

For reducing to fragments all kinds of hard and brittle substances, such as STONE for making the most perfect MACADAM ROADS, and for making the best CONCRETE. It breaks stone at trifling cost for BALLASTING RAILROADS. It is extensively in use in MINING operations, for crushing

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BLAKE CRUSHER CO., New Haven, Conn.



### Reduced Price List, JANUARY 25th, 1876.

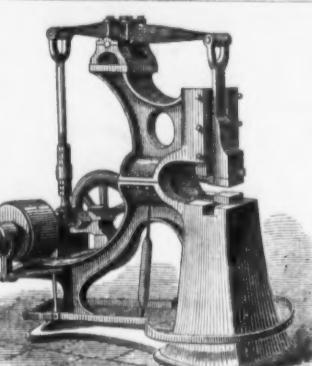
For dimensions of Governor, see Illustrated Price List.

Size, Inch.	Plain.	Bright Fin- ished.	Extra for Lever.	Stop Valve.
1 1/2	\$17.00	\$19.00	\$1.90	..
1 3/4	19.00	21.00	2.00	\$5.00
2 1/2	25.00	28.00	2.25	6.00
2 3/4	33.00	32.00	2.50	8.00
3 1/2	40.00	40.00	2.75	10.00
4 1/2	48.00	32.00	3.00	14.00
4 5/8	51.00	3.50	15.00	..
5 1/2	56.00	3.75	17.00	..
5 3/4	61.00	3.75	20.00	..
6 1/2	64.00	3.75	20.00	..
7 1/2	84.00	5.00	20.00	..
8 1/2	94.00	6.00	24.00	..
9 1/2	125.00	6.50	48.00	..
10 1/2	138.00	7.00	54.00	..
11 1/2	165.00	8.00	68.00	..
12 1/2	202.00	9.00	80.00	..
13 1/2	225.00	10.00	..	..

THE JUDSON PATENT Improved Steam Governor.

No Charge for Boxes & Cartage.

JUNIUS JUDSON & SON, Rochester, N. Y.



THE PALMER POWER SPRING HAMMER.

Of these Machines we are building sizes to meet the requirements of all Manufacturers and Workers of Iron and Steel. In simplicity, durability, ease of operation, accuracy, and range of work, we guarantee them superior to any Machines of their kind produced in the world. For prices, references, and full descriptive circulars, address

**S. C. FORSAITH & CO.,**  
Manchester, N. H.

## Knowles Patent Steam Pumps

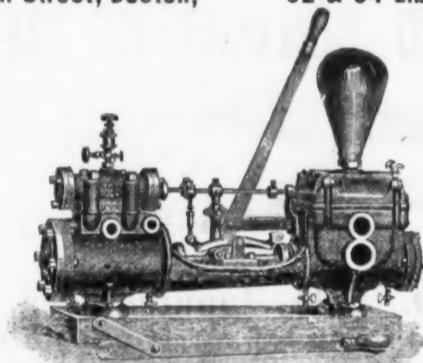
MANUFACTURED BY THE

## KNOWLES STEAM PUMP WORKS, WARREN, MASS.

WAREHOUSES:

14 & 16 Federal Street, Boston,

92 & 94 Liberty Street, N. Y.

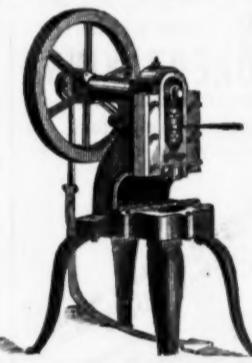


Cut above represents regular Boiler Feed Pump, No. 3 and 4. Showing New Patent Valve Motion, and Hand Power LEVER Attached and Detached.

### FIRE PUMPS a specialty.

Mining Pumps (both Double Acting Plunger, and Piston Pattern,) which we guarantee to run absolutely noiseless on any lift from 100 to 600 ft., at a single lift, a specialty. Pumps for every possible duty. Prices *as low as any*, and our workmanship and material altogether the Best.

Every machine furnished under a complete guarantee.



**A. H. MERRIMAN,**  
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Patentee and Sole Manufacturer.

I warrant every part of this Machine to stand the shock  
of the wheel running at 125 revolutions.

West Meriden, Conn.

Machinery Hall, Philadelphia, Section B 4, Columns 28 and 29.

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To 125 North 4th Street,

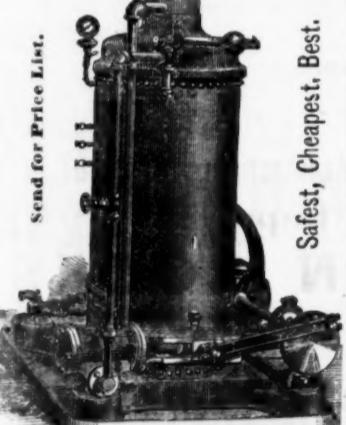
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All Styles and Sizes on hand, and made to  
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Manufacturers of all kinds of

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FOR DENTAL AND MANUFACTURING PURPOSES.

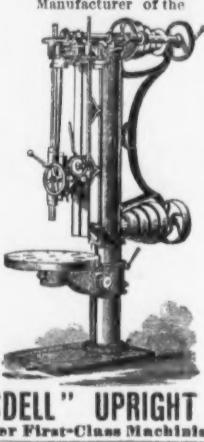
One of the Strongest, can be run with or without water, and will not  
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Office, 228 Market Street,

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Send for Price List and Circular.

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Manufacturers of the



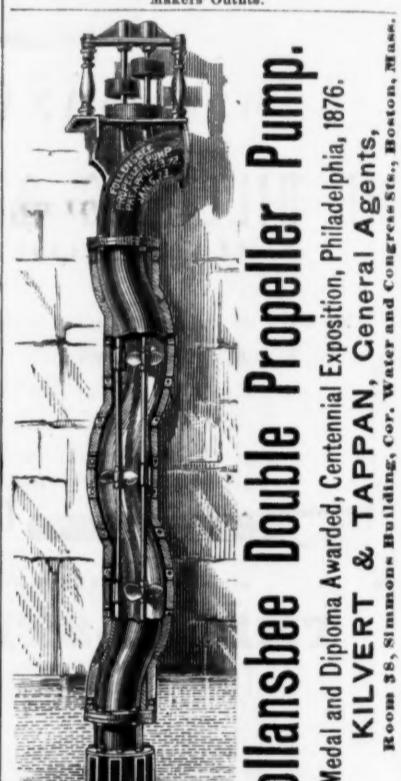
"BLAISDELL" UPRIGHT DRILLS  
And other First-Class Machinists' Tools.



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**ALFRED BOX & CO.,**  
Manufacturers of  
Machinists' Tools, Pulleys, Shaftings  
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Patent Universal Radial Drills, Steam Hammers, Boiler  
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Medal and Diploma Awarded, Centennial Exposition, Philadelphia, 1876.  
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Manufacturers of  
COTTON GINS,

With or without  
Self-Feeding Attachment & Condenser.

Cotton Gin Saws, Ribs and other Gin materials. Also  
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Press. Send for Circular.

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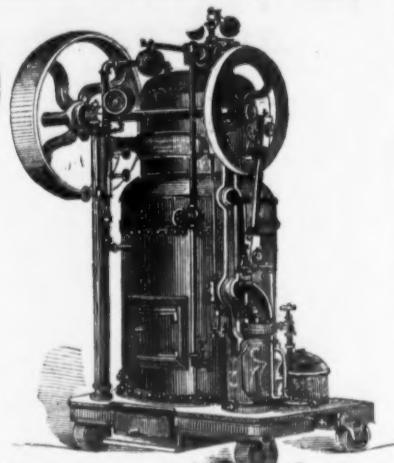
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Patented Feb. 10, 1874.

COMPACT,  
PRACTICAL,  
DURABLE,ECONOMICAL.  
\$200.00.Cheaper than any Engine offered of  
the same capacity.

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Engineer, Machinist, Founder and Boilermaker  
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GENERALLY.  
Special Machinery  
BUILT TO ORDER.



**The C. O. D. Engine**  
**COSTS LESS**

And is equal to any Engine in the market.  
ALL WORKING PARTS WELL FINISHED.No. 1, Cylinder 4x6. .... \$125.00  
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Wheatcroft's Self-Adjusting Pipe Wrench,

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SCRIPTURE'S FUNNEL TOP OILERS.

**Keystone Pressure Blowers.**Anti-friction and noiseless; maximum blast and minimum power;  
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**KEYSTONE EXHAUST BLOWERS.**

Made on same principle.

For Ventilating Mines, Buildings, etc.; Removing Dust,  
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Blower Guaranteed. Send for circular, or  
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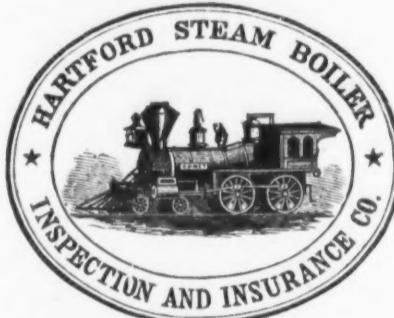
## Engineers, Iron Founders and Machinists.

## RAILWAY SHOP EQUIPMENTS.

Our Steam Hammers, Lathes, Planers, Drills and Bolt Cutters  
Are of Improved and Patented Construction.Railway Turning and Transfer Tables,  
SHAFTING & MILL GEARING, a specialty.

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GIFFARD'S INJECTOR--IMPROVED, SELF-ADJUSTING.



Issues Policies of Insurance after a careful Inspection of the Boilers

COVERING ALL LOSS OR DAMAGE TO

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ARISING FROM

## STEAM BOILER EXPLOSIONS.

The Business of the Company includes all kinds of STEAM BOILERS;

Full information concerning the plan of the Company's operations can be obtained at the

COMPANY'S OFFICE, HARTFORD, CONN.,

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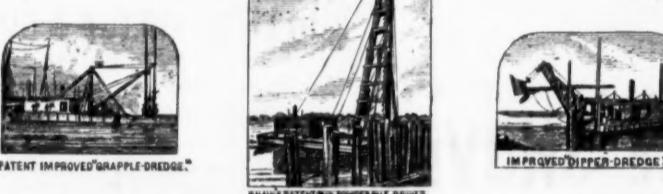
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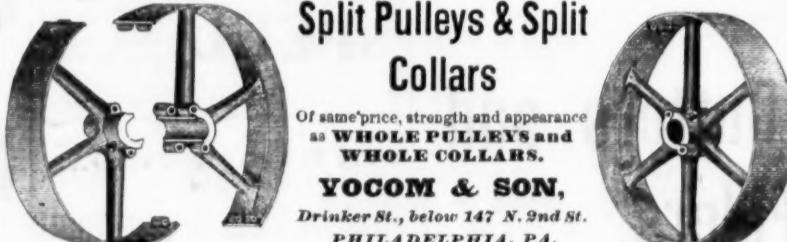
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Drills for Coes, Worcester, Hunter and other Hand Drill  
Presses. Beach's Patent Self-Centering Chucks, Center  
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Drill Grinding Machines. Taper Reamers. M  
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All Tools exact to Whitworth Standard Gauges.

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## Machinery, &amp;c.

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In Department F, Group 3, at the 44th  
Exhibition of the

AMERICAN INSTITUTE.

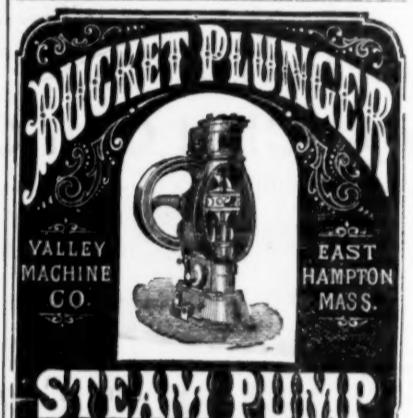
Held in the City of New York, Oct., 1875

No. 318, Drawing, Drop &  
Punching Presses.THE STILES & PARKER PRESS CO.,  
Of Middletown, Conn.The machinery exhibited by these makers is of a  
character that calls for special commendation. In  
relation to their well known punch press, it  
which is a feature to bring all in a press ad-  
justable to any size of work, and effective.Your committee would most reluctantly recommend  
for this exhibition the "Medal of Progress," but  
find such award debarred by the rule of the Institute,  
prohibiting such award unless a Silver Medal has  
been previously awarded. We, therefore, respect-  
fully recommend the award of a Silver Medal.Silver Medal Awarded.  
A true copy from the Report on file.

JOHN W. CHAMBERS, Sec'y.

AQUOMETER  
Steam Pump.

Highest Premium awarded by  
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For Simplicity, Economy of  
Construction & Efficiency.

An absolutely Durable, Cheap, Efficient and Eco-  
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## EUREKA SAFETY POWER!

Practically impossible to  
explode. Tested to 3000  
psi. on square inch, with  
slit 4 inch seasoned oak—grind  
bustle. Corn per hour. Price  
\$100.00. Stationary Engines  
and Boilers and Safety Pre-  
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cular. Discount to the trade.

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## VOLNEY W. MASON &amp; CO.,

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## FRICTION PULLEYS

Friction Clutches

For Connecting Shafting and Gearing.

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**PAUL S. REEVES,**  
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**ANTI-FRICTION METALS.**

XXX Genuine	40c	C	30c
XX	38c	D	28c
XXI	35c	E	25c
X	30c	F	20c
B	25c		

Note.—The above are my standard mixtures, and have given satisfaction wherever used, but I am prepared to make Anti-Friction Metal of any quality or mixture desired by the purchaser.

**BRASS CASTINGS,** INGOT BRASS, BRASS TURNINGS AND OLD METALS WANTED.

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PHILADELPHIA,

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**Elliptic, Platform AND C Springs,**  
MADE EXCLUSIVELY FROM

SWEDISH STOCK, OIL-TEMPERED and WARRANTED.

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CAST SPRING AND PLOW STEEL.  
CAST SHOVEL, HOE AND MACHINERY STEEL.

OXFORD TOE, SLEIGH, TIRE AND SPRING STEEL.  
BESSEMER SHOVEL AND PLOW STEEL.  
BESSEMER MACHINERY AND CULTIVATOR STEEL.

RE-ROLLED NORWAY SHAPES.  
NORWAY NAIL RODS ROLLED AND SLIT FROM SUPERIOR BRANDS.

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IN ALL STYLES AND VARIETIES.

Highest Centennial Award.

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THIS CUT REPRESENTS THE

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The Best and Cheapest Shovel in the World.

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Most Reliable Plated Spoons and Forks. Highest Honor Awarded Centennial Exhibition.

Having arranged with the manufacturer for the sale of these goods at lowest market rate, we offer to the trade

**PERRY'S**

**Improved Meat Cutters and  
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STORE TRUCKS, BARREL TRUCKS, BAG  
TRUCKS, BAGGAGE TRUCKS,

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**CLARK'S PATENT WAGON JACKS.**

These Goods are superior in quality and finish. Orders solicited.

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A Substitute for Steel and Wrought Forgings.

Circulars sent on application.

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We make Steel Castings true to pattern, sound and strong. Can be worked same as bar steel. Plowshares, Mold-boards and Land-sides, Anthracite Coal-breaker Teeth, Wheels and Pinions, Dies and Hammer Heads, Engine and Machinery Castings of all descriptions, Railroad Frogs and Crossings. Invaluable for all articles requiring great strength and durability.

Send for Circular.

**PITTSBURGH STEEL CASTING CO.,**  
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**Crucible Steel Castings**

Light and Heavy **STEEL CASTINGS** of superior quality made on short notice, true to pattern, solid, strong and durable, can be readily forged and tempered.

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PITTSBURGH, PA.



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**BRASS and IRON**

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**SLIGO IRON MILLS**

Established 1825.

**PHILLIPS, NIMICK & CO.**

The only Manufacturers of

"Sligo" Fire Box Iron, Boiler Plate, Sheet and Bar Iron,

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"Tyrone" Brand of Bar, Tank & Sheet Iron, Girder and Ship Plates, Angle and Horse Shoe Iron, &c., &c.

Plates Rolled 100 inches wide.

**OFFICE AND MILLS,**

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Quality Bolt Iron, Warranted Unexcelled.

IRON HEADS & FLUE HOLES

FLANGED TO ORDER.

Quality our Specialty.

**UNIFORM SPEED** WARRANTED THE MOST PERFECT GOVERNOR IN THE WORLD. However great or violent may be the change of load we will warrant any positive uniform speed of engine desired. ADDRESS: HUNTOON GOVERNOR CO., LAWRENCE MASS.

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**SUPPLIES.**

Brass, German Silver & Leather Dog Collars.

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J. M. EVERHART,

Manufacturer of Brass Work or

Water, Gas and Steam. Brass

Castings and Jobbing promptly attended

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**DU PLAINE & CO., Philadelphia.**

**ANTI-FRICTION METALS.**

We respectfully submit the following recommendations, of many received: WILLIAMSPORT FURNITURE MANUFACTURING CO., WILLIAMSPORT, PA., Feb. 26, 1875. Messrs. DU PLAINE & CO.: Gentlemen—Having had over two years' experience with your XXX Babbitt Metal, it is with great pleasure we recommend it. It is most decidedly the Best and Cheapest Metal we have ever used, from its great saving in labor, oil and vexatious and expensive delays; as it is less liable to become hot, and wears twice as long as any other metal we have ever used. Yours, truly, F. MANKEY, Sup't Mechanical Dep't.

(Signed.) D. B. HUBBARD, President.

OFFICE A. WILT & SON, Door, Sash, Shutter, Window Frame and Molding Manufactory, General Wood Working Mills, Nos. 711, 715, 717, 719, 721, 723 N. Front Street, PHILADELPHIA, PA.

Messrs. DU PLAINE & CO.: Gentlemen—After using your Babbitt Metals for a very long time, and giving them a thorough trial, they have proved a satisfactory test. We are convinced that it is the Best Metal we have ever used, and as such we recommend it to the notice of all. We do not intend being without a supply, as we find it has become a necessity to us. Truly yours, A. WILT & SON.

THOMAS WOOD & LUKENS, ALAN WOOD & CO., Manufacturers of Sheet and Plate Iron, SCHUYLER IRON WORKS, CONSHOHOCKEN, 16th mo., 1876.

Messrs. DU PLAINE & CO.: Gentlemen—In reply to yours of yesterday, we take great pleasure in saying that your Babbitt Metals have always given us entire satisfaction. We constantly subject it to the heaviest mill work, and never find it wanting in all that is required of it. Very truly yours, ALAN WOOD & CO.

WARREN FOUNDRY AND MACHINE CO., PHILADELPHIA, N. J. After using your XXX and other Babbitt Metals for over two years, and giving them a severe and thorough trial, they have proved a very satisfactory test, and I am convinced that they are the Best Metals we have ever used, and so recommend them. Yours, truly, JOHN E. REIEF, Master Mechanic and Superintendent.

**Russell, Burdsall & Ward,**  
PORT CHESTER, N. Y.

Manufacturers of  
**Carriage, Tire, Plow, Stove,**  
AND OTHER  
**BOLTS.**

Carriage Bolts made from Best Square Iron, a Specialty.

**THE BURNING OF THE BROOKLYN THEATRE.**

"Many who were in the parquet and dress circle may owe the preservation of their lives to the fact that the doors opened freely 'in and out, on what are known as double acting hinges.'—N. Y. TRIBUNE, Dec. 8th, 1876.

The Hinges on the doors referred to, were the Double Acting Spring Hinges, manufactured by the American Spiral Spring Butt Co., 82 Beckman Street, New York.

**M. W. ROBINSON, SOLE AGENT**  
**UNION SPRINGHINGES**

79 CHAMBERS ST. N. Y.

Patented June 29, 1876.

A Section of hub complete, showing oil-chamber o.

B Front band, a Nut which screws on to band.

C and connects box D and band B to the hub.

D Box and back band in one piece.

E Axle. F Wrench in place on back nut.

G Axle with back nut unscrewed from the collar, and both

leaves washer each side of

collar, and front band in place.

Points of Excellence.

No oil can come in contact with the wood of the hub to loosen the spokes, or otherwise injure the wheel.

No oil can escape to deface the wheel and spoil the varnish.

No dirt, gravel or water can work upon the axle.

It is a superior and durable axle.

It is easier to fit than a common axle. It is adapted to any kind of a wheel. It requires no wedging to box the wheel.

It will run 500 to 1000 miles at a single oiling.

In ordering, give size of axle wanted, diameter of front band, and diameter of hub.

**HENDRY'S PATENT THILL COUPLING SPRING.**

This useful invention meets a great want, and will be easily understood from the cut. The spring is made of Best Cast Steel tempered, and is adapted to any coupling where running is required. It is neat in appearance, and all rattling, is impossible as steel, and cannot be a trike.

Call for it at your nearest hardware dealers, or we will send set by mail, postage paid, on receipt of fee. Manufactured by

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All Tacks assorbed by our new PATENT ABSORBER, which removes all dust and silvers and poor Tacks, so that the purchaser pays for nothing but perfect goods.

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**CARBON BRONZE** Specialty.

Castings for Cars, Mills and Machinery most durable Journal Metal made.

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